

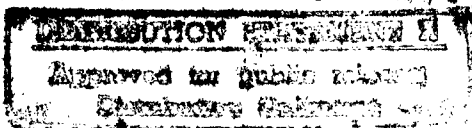
FM 31-30

DEPARTMENT OF THE ARMY FIELD MANUAL

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**JUNGLE
TRAINING
AND
OPERATIONS**

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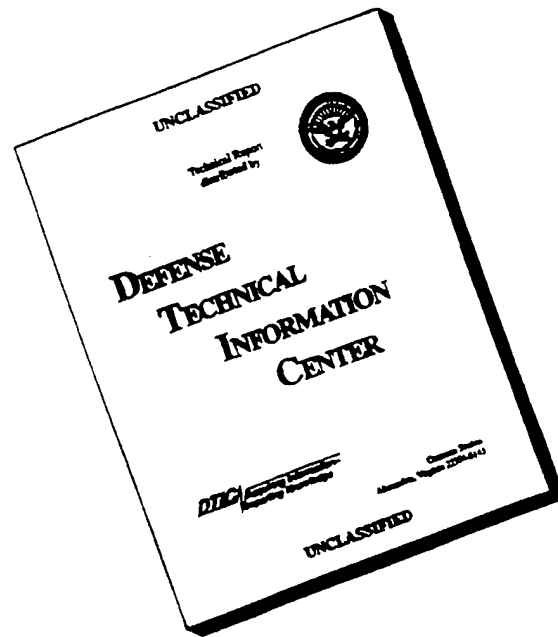
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*FM 31-30

FIELD MANUAL

No. 31-30

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 23 September 1965

JUNGLE TRAINING AND OPERATIONS

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* This manual supersedes FM 31-30, 5 October 1960.

CHAPTER 1

INTRODUCTION

1. Purpose

This manual is for use as an aid to the individual soldier and the junior leader in learning how to prepare for and conduct jungle combat. Emphasis is placed on techniques which will enable the soldier to fight, live, and move in the varied types of terrain, vegetation, and climatic conditions peculiar to jungle. It will furnish guidance to commanders and staff officers in the preparation of units for combat and will afford a reference on doctrinal concepts applicable to jungle operations.

2. Scope

This manual describes the distinguishing characteristics of jungle environment and the resultant effects of these characteristics on individuals, equipment, and operations. Sufficient material is included to enable commanders to organize, initiate, and establish an effective jungle training program. Emphasis is placed on special techniques for use in jungle operations, employment of supporting arms and services, and communications. Administration and logistics also receive attention com-

mensurate with importance in operations conducted in jungle terrain.

3. Publications

a. This publication supplements and, in some instances, amplifies pertinent portions of manuals in current use. Emphasis has been placed on application of approved doctrine and techniques under conditions imposed by jungle terrain. It is to be expected that units preparing for or conducting jungle operations will find it necessary to consult other appropriate publications. Those references applicable to training and combat in jungle are included in appendix I.

b. To improve this manual, users are encouraged to submit recommended changes or comments. Comments should be keyed to the specific page, paragraph, and line of the text in which changes are recommended. Reasons should be provided for each comment to insure understanding and complete evaluation. Comments should be forwarded direct to Commander, United States Army Forces Southern Command, Fort Amador, Canal Zone.

CHAPTER 2

THE JUNGLE

Section I. GENERAL

4. Prevalent Misconceptions

The soldier who is not familiar with the jungle will suffer from conditioned fears and apprehensions when faced with the prospect of living and fighting in a jungle environment. Popular representation of the jungle as being a veritable green hell of large trees and dense underbrush growing over vast expanses of flat, swampy ground and inhabited by thousands of animals, snakes, and insects which are hostile to man, cause this fear. Before such individuals even set foot in the jungle they are appalled at the prospect of doing so. Certainly the foreboding appearance of the jungle, the oppressive humidity and heat, the unfamiliar noises, and the abject feeling of loneliness that one feels when entering the jungle intensify the already existing fear of the unknown. It cannot be denied that the jungle presents some most unpleasant aspects. But the individual must, through systematic and thorough training and acclimation, learn to know the jungle for what it actually is and not for what it is supposed to be or what it might be. Once this knowledge is acquired, the soldier will respect the jungle, not fear it.

5. Definitions

a. *Jungle*. For the purposes of this manual, the word "jungle" means an area located in the wet tropics and dominated by large trees and varied types of associated vegetation in which an abundance of animal, insect and birdlife exists.

b. *Terrain* simply refers to any area or tract of ground which is considered with regard to its natural and manmade features and the effects that these features will have on military utilization of the ground.

c. *Terrain Features* include all of the elements which make up the earth's surface. These elements comprise:

- (1) *Topography*—The shape or configuration of the land's surface.
- (2) *Hydrography* refers to the study of oceans, lakes and rivers (to include relief and drainage) as affecting military utilization of terrain.
- (3) *Vegetation*—includes all plant life, both natural and cultivated.
- (4) *Surface materials*—the nature of soils with particular emphasis on area trafficability.
- (5) *Cultural features*—includes all the works of man.

d. *Climate* denotes the prevailing or average weather conditions of a specific place as determined by the recorded temperature and meteorological changes measured over a period of years.

e. *Weather* is the condition of the atmosphere at a given place at a specified time.

6. The Tropical Zone

The tropical zone lies between the Tropic of Cancer and the Tropic of Capricorn. Within this zone there are such diverse environmental conditions as snow-capped mountains, barren deserts, and steamy forests. This manual is concerned only with part of the tropical zone, the part in which the temperature and relative humidity remain high throughout the year. Areas within this part of the tropical zone are considered to comprise the humid tropics, and it is in the humid tropics that jungle terrain is found. Figure 1 gives a generalized view of the areas of the world included in the humid tropics.

7. Basis of Jungle Warfare Doctrine

The concept of warfare in the jungle is related to the conditions existing in the combat area which result from the combined effects of—

a. *Climate*. This is the dominant factor in jungle areas. It is characterized by heavy rainfall, oppressive humidity and high temperatures. Besides having a definite effect on man, climate also affects the form of the land and contributes to the thick plant growth found in the jungle.

b. *Status of Terrain Features*.

(1) *Topography*. Most jungle areas on the shores of large bodies of water, lakes and rivers consist of alluvial plains and swamps. The presence of numerous ridges establishes a many-branched drainage system and causes a rugged and complex terrain structure (fig 2).

(2) *Hydrography*. Jungle is characterized by many streams which drain the ridges and by large rivers which are deep, swift and difficult to cross. Streams and rivers usually become raging torrents during the rainy season.

(3) *Vegetation*. The element most often associated with the jungle. Many types of plant growth exist in great abundance. This vegetation is characterized by rapid growth, dense concentration and a natural ability to resist enemies.

(4) *Surface materials*. Vary from the highlands to the lowlands. The uplands soil is usually composed of fine-grained materials having a clay-like composition. The lowlands are generally of silty composition. Trafficability afforded by either type soil is generally very poor, especially during rainy periods.

(5) *Cultural features*. Are so scarce in most jungle areas that any works of man, regardless of how primitive, are liable to assume critical significance in combat.

Section II. THE JUNGLE ENVIRONMENT

8. Primary Characteristics of the Jungle

Trees interconnected by a network of thick vines are the principle identifying features of a jungle. Primarily responsible for the lushness of the vegetation is a combination of high temperature and relative humidity throughout the year and a heavy annual rainfall. Much of this rainfall is in the form of torrential showers, the runoff from which causes flash floods and scours the stream courses. As a result, most jungle areas are cut by many steep-sided gullies (fig 3). Another important consideration in the jungle is the absence of moving air, a factor which makes conditions extremely uncomfortable. These are the characteristics that prevail in all jungles, but not all jungles provide the same operational environment. (For climatic details, see TM 1-300.)

9. Types of Jungle and Associated Terrain Features

a. *Primary Evergreen Rainforest*.

(1) *Lowland Forests*. In these forests a continuous "canopy" of tree branches 100 to 200 feet above the ground blots out the sun from the forest floor which, as a consequence, supports the growth of relatively few, shade-tolerant, shrubs (fig 4). In the

semidarkness that prevails in this type of jungle, only the leaves on the many thick, woody vines that hang from the trees and grow along the ground aid the trunks in obscuring horizontal visibility. Heavy rainfall throughout the year supports this forest and the ground is nearly always wet and slippery. The humidity remains extremely high even during the hottest part of the day because the canopy retards the drying effect of the sun. For the most part, this jungle is extensive only in areas remote from civilization.

(2) *Highland Forests*. As an illustration of the extreme variations of climatic and vegetative conditions that are found in jungle areas, it is worthy to note and consider a variant of the evergreen rainforests which is called a "cloud forest" or "moss forest" (fig 5). In mountainous terrain located near the equator at elevations from 3,000 to 12,000 feet above sea level this type forest may be found. Large trees dominate but extensive growths of ferns and mosses are also found. All vegetation, the ground and prominent rock formations are covered with a heavy slime or moss covering (fig 6). The tempera-

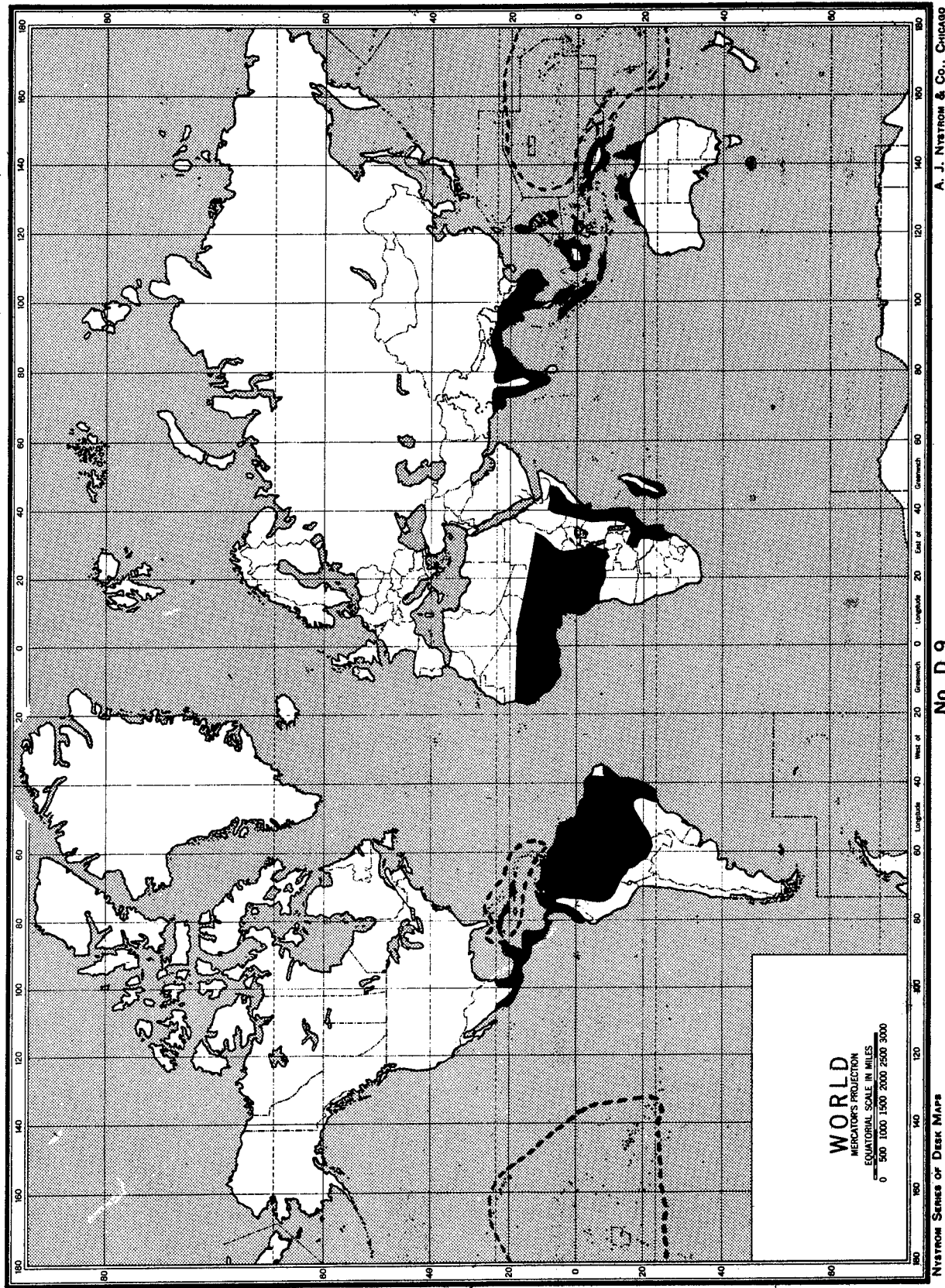


Figure 1. Shaded areas delimit the humid tropics.



Figure 2. Typical topography of jungle areas. The slopes of such hills are very steep, extremely slick when wet and are usually shot through with numerous gullies and ravines.



Figure 3. Erosion hole in large gully which drains a high ridge. These holes are often very deep and are a serious hazard to troops especially when moving at night.



Figure 4. The jungle canopy. The interconnected system of tree limbs forms a veritable roof over the jungle floor. A canopy of this type in primary rainforest may be well over a hundred feet above the ground. The presence of such a canopy hides the general configuration of the ground and prevents aerial survey for mapping purposes.

ture may go as low as 60° and the humidity is always high. There is a noticeable scarcity of animal, insect and bird-life. Movement in this forest is extremely arduous and hazardous as the slopes are quite steep, the ground is slick and deep layers of ground moss cover the ground over hidden fissures of the surface. Although a cloud forest is a most eerie and uncomfortable place in which to live, it would suit the needs of a guerrilla force quite well.

b. *Secondary Evergreen Rainforest* (fig 7). A dense, tangled mass of scrub trees, bushes, and jagged grasses occupy the space between the tree trunks in this type of jungle. The upper story canopy of trees generally is between 50 and 100 feet tall, with a second story canopy ranging from

15 to 35 feet high. The top canopy is relatively open, allowing the sunlight to reach the ground in numerous places. Because of this, the plants in this forest form an almost impenetrable undergrowth. Although this forest is not nearly as dark as the primary rainforest, the horizontal visibility is considerably lessened by the dense undergrowth. The temperature is somewhat higher than in the primary forest and the humidity is somewhat less, but overall it is just as uncomfortable for troops.

c. *Mangrove Swamp* (fig 8). Associated with the evergreen rainforest, in coastal areas subject to tidal flooding, are extensive mangrove swamps. Closely spaced trees with branching "prop" roots form a barrier to any type of movement. With the ground obscured by standing water nearly all of the time and the steeply arching roots hampering horizontal visibility and providing an extremely



Figure 5. Typical "moss" or "cloud" forest.

slippery surface on which to stand, a mangrove swamp is useful primarily as a place to hide. On their inland margins, where the water is less saline, mangrove swamps are bordered in many places by other types of swamp. The various types of mangrove swamps can usually be identified by the color of the bark of the larger trees. This is important as there are distinct differences of growth intensity, degree of flooding and incidence of vines. All these factors have a potential effect on movement and should be noted. Types of mangrove swamps and growths are:

- (1) "Red" mangrove grows in deeply flooded areas and produces both aerial roots which drop to seek water and ground roots which branch out in a tangled, tent-shaped mass, forming an almost impenetrable barrier. Figure 9 shows a typical stand of "Red" mangrove.

- (2) "Black" mangrove produces the maze of ground roots usually associated with mangrove growths. However, aerial roots are not usually found in this type swamp; thus, it can be expected that movement through this type would be comparatively easier than is the case with the red bark type. Figure 10 shows this difference.
- (3) "White" mangrove (figs 11 and 12), which actually appears gray in color, has no tent-shaped mass of prop roots. Also, there is more space between the individual trees and they are usually in a shallower stand of ground water. For these reasons it is easily the best of the three sub-types for ground movement; but, it must be remembered that even a white mangrove swamp is a very dense and difficult place for a unit to operate.



Figure 6. A view of the forest floor in a typical moss forest. Here is the domain of gnarled trees, lichen-fringed and covered with moss and liverwort. Movement through this forest is all but precluded by the thick mat of growths which may be as deep as a normal man's height.



Figure 7. Secondary evergreen forest.

d. *Swamp Forest Sub-Types.*

- (1) *Palm Swamp.* This is generally characterized by flooded ground and no canopy of overhanging trees. Two of the most common types are "Manicaria" and "Acosticum" palms. Manicaria palm produces common and useful palm fronds and usually stands in water that is not too deep to traverse. It is also mixed, normally, with many other types of growth, as is common with most jungle vegetation. Acosticum palm, which produces a beautiful fern, normally stands in higher water but usually grows by itself because of its tendency to choke out other plants. Figures 13 and 14 illustrate the several sub-types of palm swamps.
- (2) The "Catalval swamp" derives its name from the "Cativo" or "Catalval" tree. Although this is a Latin American word, it

should be understood that this type of forest can be found in most jungle areas of the world. Catalval swamp is the transition between swamp forests and upland forests. It is so named for the common Catalval tree, which produces a high, closed canopy of branches. These shut out the sunlight and prevent the growth of much low vegetation. Sometimes catalval swamp has standing ground water, but it is often dry. Figure 15 shows a typical stand of Catalval.

- (3) Coastal thicket is another sub-type of swamp forest. It is found along sandy beaches near sea level. It is very thick and dense, very hard to traverse, and can be recognized by the presence of scattered coconut palm trees which will grow very close to salt water (figs 16 and 17).



Figure 8. Typical mangrove root maze shown at low tide. Caution must be exercised when attempting to hide in or move through such growths as a man who becomes entangled in the root system could be drowned by the rising tide water.

e. *Marsh.* In areas where the water is not brackish enough for mangrove, but where it is too wet for most forest trees, marshes can usually be found. These generally are composed of tough, thick reeds up to 15 feet tall and form a solid mass of vegetation; usually it is impossible to see someone even a few feet away. Most of these marshes are relatively small, but those that are situated adjacent to a trail are ideal places for ambushes.

f. *Dry Season Deciduous Forest.*

- (1) All of the vegetative types mentioned above occur in areas where the rainfall is fairly high throughout the year. Although there usually is a so-called dry season, it actually is more accurately a less-rainy season. In much of the tropics, however, there is a true dry season, lasting

- from three to six months, with almost no precipitation. In contrast to the tropical evergreen trees of the rainforest, many of the trees in the areas experiencing a dry season are deciduous, i.e., they shed their leaves sometime during the year. This does not mean that at the beginning of the dry season the trees lose all of their leaves; neither does it mean that the forest achieves the bare look in the manner of a deciduous forest in the mid-latitudes. The leaves fall gradually and it is a rare tree that becomes completely bare.
- (2) The upper story canopy of a primary dry season deciduous forest generally is formed by trees that are not more than 100 feet tall. Where the canopy is continuous the undergrowth is very light. Where breaks occur in the canopy the



Figure 9. Red mangrove growth. The aerial roots seek the water below and strike root into the ground.

undergrowth is very dense (fig 18). Extremely dense undergrowth is characteristic of all of the secondary deciduous forest. High thorny shrubs, knife-edged and saw-toothed grasses, and spiny vines are common features. Even during the dry season these features reduce horizontal visibility to very short distances. During the rainy season climatic and soil conditions within this type of forest are nearly identical to those in the rainforest; but during the dry season the ground becomes dry and hard and temperature and humidity fluctuations are much greater than in the rainforest. Since the climatic conditions are somewhat more pleasant in areas having a dry season than in areas where rain falls the year round, there usually are more people living in the dry season areas. The greatest number of

people depend on small scale agriculture for their livelihood.

g. Cultivation.

- (1) Throughout the tropical areas of the world a large percentage of farmers till the land in a relatively similar manner. Several acres of trees are cut during the rainy season and the logs and stumps are left in the clearing. These then are burned during the dry season. At the beginning of the rainy season the farmers punch small holes in the ground with pointed sticks, drop a few seeds in each hole, cover the seeds by stamping the ground with their feet, and wait for the crop to grow. After the second year of use, a clearing is abandoned and a new clearing is made. This is commonly called "slash and burn" agriculture (fig 19). Abandoned clearings usu-



Figure 10. Black mangrove. Note the absence of aerial roots.

ally contain a dense growth of scrub vegetation in which relics of former crops, such as bananas, may be found.

- (2) The cultivation of wet rice, though not directly related to jungle operations, is an important consideration in the more densely populated parts of potential operational areas. Wet rice is grown on both the lowlands and the hill slopes (fig 20). In the lowlands rectangular fields separated by dikes one to two feet high are flooded during the growing season through an intricate network of canals and irrigation ditches. On the hill slopes terraces are constructed on which to grow the rice; dikes surround the terraced fields and the fields are flooded by gravity flow. Since most of these rice fields are fertilized by human feces, accidental puncture of the

skin while crossing these fields will almost certainly result in an infection.

- (3) More closely associated with, and in some areas completely surrounded by jungle, are several types of tree crops, primarily rubber and coconut. These trees generally are grown in plantations, where the trees are planted at regularly spaced intervals and all underbrush has been removed. Having the appearance of well-tended parks, rubber and coconut plantations afford a welcome respite from the jungle but provide little concealment or cover.

h. Savanna. Tropical grasslands begin along the fringes of the dry season deciduous forests. The only trees found in the savanna grow in scattered small groves or isolated single stems. Grass which is as much as 15 feet tall in the more well watered areas to as little as 3 feet tall in the more arid



Figure 11. White or gray mangrove. The trees are small and the water level is usually not as high as that found in other mangrove areas.

sections comprises the principal vegetation. Horizontal visibility in the tall grass is reduced to a few feet and in some places it is possible for walking men to be completely obscured from aerial observation. The highest temperatures in the humid tropics are recorded in the savanna areas, and the daily differences in both temperature and humidity are greater than in the other areas described. See figure 21 for a representative example of savanna grass.

i. *Bamboo*. This member of the tropical tree-like grass family grows in clusters or concentrations of varying intensity throughout the wet tropics. The springy, hollow jointed stems vary greatly in circumference and height. Some growths attain a height of well over a hundred feet. Horizontal visibility is extremely limited, usually to only a few feet. Movement through bamboo is

slow and arduous. Men used as cutters and trail breakers in bamboo growths should be relieved at five to ten minute intervals. Inasmuch as bamboo offers such great resistance to penetration and because movement is out of necessity very noisy, it should be avoided or bypassed if possible.

10. Distance and Movement

a. *General*. Vines that entangle and trip even the most careful person, steep stream banks with slippery soils, shrubs and trees with thorns that penetrate and tear clothes, grasses with knifelike and saw-toothed edges that cut the skin, combined with constantly high heat and relative humidity, make jungle an extremely difficult place in which to move. Even where trails are available conditions are not improved to any great extent especially during, and immediately after, rains. In areas where the vegetation is extremely dense and



Figure 12. Patrol moving through white mangrove.

deep it may be necessary to follow the beds of streams. If the stream bottom is either rocky or soft, movement may still be very difficult. Darkness, which occurs with great rapidity in the jungle, compounds the problems of movement. In general, tropical nights are approximately 12 hours long throughout the year. Chief among jungle navigation problems is the difficulty of estimating distances. Rarely are there landmarks against which to check as reference points for the distance traveled. Only in very few instances will it be possible to correlate accurately a given jungle area to a map. In almost all cases a soldier will estimate that he has traveled much farther than he actually has because he usually will have expended a considerable amount of energy to go only a fairly short distance.

b. Estimating Time-Distance Factor. Terrain in jungle areas offers many variations. As a result,

movement rates can be expected to vary similarly. Because of many factors attendant to movement such as physical condition of troops, equipment and individual man loads, weather, etc., it is most difficult to estimate accurately travel times for movement by infantry. It is best to express estimates in terms of time and not distance. For planning purposes the following data are offered, but it must be kept in mind that accurate estimates can be realized by commanders only through experience and knowledge of troop capabilities:

- (1) *Primary evergreen forest.* The average rate of movement is about 1000 meters to the hour, dependent upon the incidence of hills, rivers or swamps which will slow progress considerably.
- (2) *Secondary evergreen forest.* Average rate about 500 meters per hour.



Figure 13. *Manicaria* palm swamp. Note tolerance of this large tree for other types of plants.

- (3) *Swamps*. Average rate about from 100–500 meters per hour.
- (4) *Bamboo*. Extremely slow, dependent upon size. Closely growing bamboo is one vegetation that can slow movement to almost a standstill.
- (5) *Savanna*. Rate of movement about the same as for secondary evergreen forest, but more taxing and exhausting.
- (6) *Trails*. If their use is permitted or feasible under the immediate tactical situation, the speed of movement will approach that of movement in open country. All of this is contingent upon the factors described.

11. Transportation Facilities

With very few exceptions surface transportation facilities in the humid tropics are poorly developed. Railroads are rare and those that do exist are

generally narrow-gauge and have very low carrying capacities; most serve as feeder lines from a commercial establishment (plantation, mine, or factory) to a port. Road nets are infrequent and limited and most roads have loose surfaces; many roads are impassable for vehicles during the rainy season. Trails passable only to pack animals or men on foot even during the best conditions are the only transportation links in large areas. In the more remote areas inland waterways are the principal transportation arteries. These same waterways are major obstacles to movement on land. There are few bridges and most of these are not capable of supporting military vehicles heavier than a $\frac{1}{4}$ ton truck. Many streams are not even crossed by foot bridges. Heavy equipment can be a definite detriment in such areas, providing more difficulties than help. Because of the lack of cross connections between existing roads or trails, communications between units moving on widely separated axes is an



Figure 14. *Acrostichum* palm of "fern" swamp. This palm tends to choke out all other types of growth.

additional problem. The limitations of surface transportation facilities transfer the major transportation requirements to aircraft. When aircraft are used, weight factors become very important. In forested areas, the problem of getting troops to the ground is paramount. The next problem is to recover these troops following execution of a mission. With all of the attendant problems, jungle operations will require the use of aircraft as a major means of transportation.

12. Diseases

a. *Prevalence.* Troops operating in the humid tropics will be exposed to a variety of diseases which are seldom found in the mid-latitudes. Although many of the disease-producing organisms live in the jungle some are common only in areas of human occupancy. Various types of fungi produce the most widespread infections. Constant exposure to high heat and high humidity cause most

troops to harbor fungus. These organisms grow at an extremely rapid rate unless a constant effort is made to keep the body dry. Foot care is most important, although fungus infections also occur quite commonly in the ears and on the hands. Water in most areas is polluted; unless precautions are taken to purify it before drinking, it may cause intestinal diseases such as dysentery. Even wells used by villagers are usually contaminated. Although natives drink this water with impunity, troops can become violently ill. Malaria is another common ailment of the humid tropics. All troop units going into such areas for extended stays should be supplied with anti-malaria medicines. Nets should be used to protect troops against insects when sleeping.

b. *Seriousness.* Such diseases as malaria, filariasis (elephantiasis), dengue fever, yellow fever, and typhus will cause total incapacitation. Fungus infections, probably the most common of all dis-



Figure 15. Catival growth. The sparse undergrowth in this forest facilitates movement by foot troops.



Figure 16. Coastal thicket.

orders, generally are more annoying and painful than incapacitating. Social diseases such as syphilis and gonorrhea are quite common in native villages; it is important, therefore, that troops avoid intimate contact with the local women. Imaginary ailments, with symptoms unheard of in medical books, often affect troops when they are first introduced to jungle environment; these imaginary diseases sometimes can be even more serious than those which are real. The stress of violent action under the conditions of high heat and humidity may cause troops to become unconscious. This phenomena is not imaginary and may occur to both acclimatized and unacclimatized troops. Maintaining a healthy force under these extremely trying conditions is one of the most difficult of all the operational problems that troop commanders may encounter.

See paragraphs 8 through 16 for a more detailed

discussion of medical problems encountered during jungle operations.

13. Visibility

a. Limits. Horizontal visibility in the areas of the humid tropics varies according to the type of vegetation (figs 22, 23 and 24). In the primary rainforests visibility is hampered by both the semi-darkness which prevails throughout the day and the vegetation, which, though not closely spaced, is relatively large in diameter. Even in the most open spaces in these forests a field of vision of more than 100 feet can be rarely obtained. In the secondary rainforest and both the primary and secondary deciduous dry season forests the fields of view are reduced to 30 feet or less in many places. In some secondary growth, views may be reduced to as little as 10 feet. In the plantations of tree crops it is quite possible to obtain views of up to 300 feet. In mangrove swamps visibility is hampered more



Figure 17. Another view of coastal thicket. In some areas the vegetation grows down to the water's edge. A clearing such as the beach in the foreground is potentially key terrain.

by the darkness than by the prop roots so it is possible in some of these areas to see as much as 50 feet. In the marshes and in the tall grass savanna fields of vision are reduced to only a few feet. In short grass savannas surface irregularities provide the principal hindrances to long distance views. Observation from the air is very difficult in all of these areas except the short grass savanna.

b. Problems. Control measures must be increased for operation in the jungle. At the same time, however, the need for silence is imperative. Even if it is not possible for men to see each other, they must have a method of knowing that the adjacent person is friendly. Whoever is doing the navigating through the vegetation must be able not only to maintain the direction of movement but also to relay information regarding progress, state of the ground, and other pertinent data to the commander of the unit. Objectives in jungle operations are

normally limited to scope for this reason. Operations are usually conducted by small units to lessen the problems of control.

14. Plant Life

Plants suitable for use as food abound in most jungle areas. For a complete discussion of useful plants, see TM 10-420, FM 21-76, and paragraph 29 of this manual.

15. Animal Life

Most animals in the jungle will not attack man unless they are frightened. There are a few exceptions, however; the Asiatic Tiger, the Latin American Jaguar, and Peccaries (commonly called wild boars) may attack unprovoked. These animals are in the minority and are rarely encountered. Even snakes will not usually attack unless they are molested. Some reptiles, such as the crocodile,

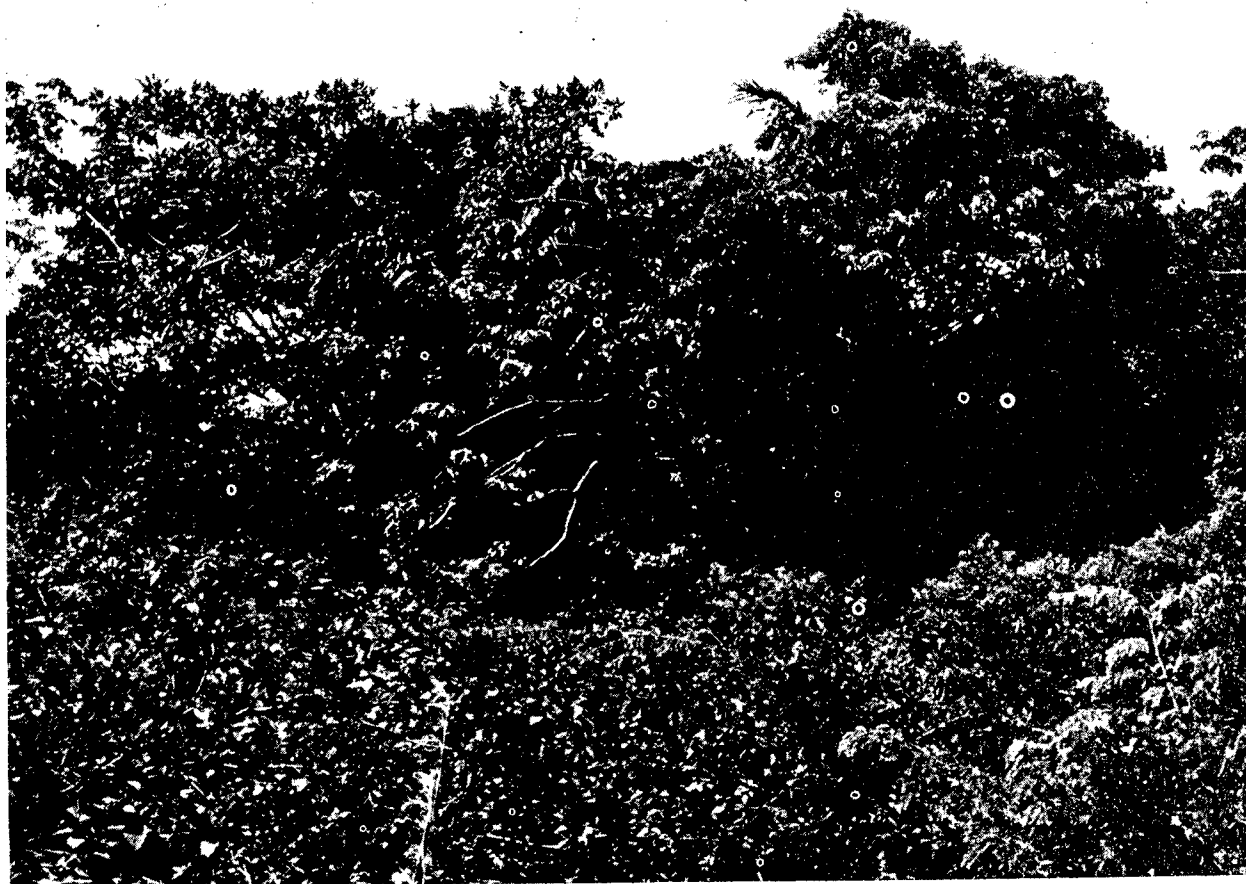


Figure 18. Dense undergrowth found at a break in the high canopy.

and some fish, such as the Piranha of Northeastern South America, will attack anything that moves. For the most part, the animals that inhabit the jungle are the least significant hazard troops may encounter.

16. Natives

The natives of an area can provide valuable assistance if they are made to feel that there is some reason for giving their help. It is necessary before going into an area, to learn about, or at least become familiar with, the customs, habits, and taboos of the natives. By violating a sacred taboo, it is possible to alienate the entire native element in an area and thus cut off a source of intelligence and a supply of potentially willing workers who could be employed as scouts, guides, carriers, construction workers, and litter bearers. The use of local interpreters when dealing with the native population can be more harmful than valuable. It is more advantageous to use sign language directly

with the head man of a village or tribe because the possibility of projecting the information desired is greater through this means. Local interpreters, in their desire to be helpful and to maintain their favored position in the community or tribe, cannot afford to indicate they do not understand and they will provide the answers that they think are wanted. The following concepts should be considered when dealing with native populations:

1. Be friendly but cautious.
2. Be courteous.
3. Respect customs, religious beliefs, and property.
4. Offer gifts with prudence.
5. Avoid threatening gestures.
6. Do not molest women.
7. Offer all assistance possible, especially medical aid.
8. Do not confiscate food, etc.; pay a fair price for everything.



Figure 19. Dense undergrowth resulting from abandonment of clearing in the "slash and burn" agricultural process used by many natives in jungle areas.



Figure 20. Juncture of grassland and cultivation with primary jungle. Terraced rice fields are in the foreground.



Figure 21. Savanna grass. Note absence of large trees.



Figure 22. Jungle trail. Horizontal visibility is frequently restricted on these trails and the trail can be lost from view quite easily if individuals step to one side more than a few meters.



Figure 23. Troops moving down a wide trail. Horizontal visibility is restricted by varying light conditions as shown in the photograph.



Figure 24. Large diameter tree common to primary rainforests. The limbs of these trees usually do not branch out from the trunk except at heights from 80 to 100 feet above ground level. It is not difficult to see how these large trees would restrict horizontal visibility severely even when the underbrush is sparse.



Figure 25. These photographs illustrate the problems of visibility and control caused by jungle vegetation. In the top picture the soldier was photographed at a distance of nine feet; he took two paces and was partially hidden from view as shown in the center photo; two more paces and he was completely lost from sight.

Section III. MILITARY ASPECTS

17. General

Movement either by vehicle or on foot is extremely difficult in jungle areas. Minor terrain features can present major obstacles to movement in combination with the dense vegetation. Because bridging equipment generally will not be available at any depth in the jungle, it is necessary to improvise for almost every river crossing where fording is not possible. Planning criteria must first be developed on the time factors involved rather than the distance to be covered. Defensive action in jungle terrain is considerably aided by natural features. Small units are the essential element in all jungle operations. They must be kept fully informed of the known situation, so they can make competent plans and decisions.

18. Observation and Fields of Fire

a. *Observation.* Ground observers are at a distinct disadvantage in jungle areas. As mentioned in paragraph 13, the range of horizontal visibility is extremely limited (fig 25). Aerial observation will provide little useful information because the jungle canopy will conceal most activity underneath. This activity may include movement of substantial bodies of troops over fairly long distances. Undetected movements of this type can mean disaster if defending troops cannot properly man defensive positions before the attack. Conversely, the attacking forces may also use the jungle cover and concealment to get into positions undetected by and unknown to the defenders. In these areas of limited observation and fluid frontal conditions the control of the fighting becomes doubly difficult. Flanks can be turned, fronts can change, and the leaders of the operation may never know that these events have occurred.

b. *Fields of Fire.* The traditional employment of automatic weapons is impractical in jungle areas. It is not normally advisable to clear fan-shaped fields of fire to provide maximum arc and coverage of sectors with these weapons. To do this would indicate clearly to the enemy the friendly fields of fire. Rather, "fire tunnels" should be carefully hollowed out of the vegetation to define the sectors of fire. For the most part coverage will be limited to the control of trails and other routes of movement and fire will be confined to very shallow areas. Even the range for snipers will be very

short. Short range, quick-burst, quick-response weapons are the most useful.

19. Concealment

In nearly all types of vegetation in jungle areas the concealment potential is tremendous. The opportunity to conceal troops from most types of surveillance devices is afforded in all types of vegetation except the very young secondary growth group. If camouflage techniques are used properly there are very few situations or conditions in which troops cannot be concealed from ground observers. Seasonal changes of coloration must be studied. Stringent discipline must be maintained in all movements and bivouacs to insure against unnecessary clearing of overhead cover and thereby permit aerial observation. Many of the vegetative features that afford concealment because of their opaque surfaces provide no resistance to bullets. It is easy for troops to mistake concealment for cover.

20. Cover

Except in the primary evergreen rainforest, the trees in most jungle areas will not provide extensive cover. Average tree trunks are generally not more than 12 inches in diameter; in areas where large trunked trees are located the trees are usually widely spaced. Most of the cover in jungle areas will be afforded by surface irregularities, such as ravines, gullies, and large rocks. These are to be found in abundance.

21. Obstacles

The jungle itself is the obstacle. This feature with its attendant psychological pitfalls and its physical adversities must be overcome before any thought can be given to an enemy force. The stresses placed on men to merely traverse the ground and the heat generated by such stresses induce a type of hypnotic spell in which the next step becomes the most important consideration, all of which dulls the mental discipline necessary to remain alert. Augmenting the natural conditions that serve to break down the spirit and fighting will of the soldier are the manmade obstacles erected by the enemy. If these obstacles are encountered when troops are in a state of fatigue they may forget that the obstacles are almost always controlled by maximum enemy firepower. Only a determined,

disciplined force in peak physical condition can hope to move and fight successfully in the jungle.

22. Key Terrain Features

All features that expedite movement, resupply, and evacuation may be key terrain features. Roads are the most critical; trails that afford relatively easy access are next in priority. Navigable waterways are also significant. Any clearing in which a helicopter can load or unload may tactically be a key feature in a major operation (fig 26). Villages, bridges and prepared fords must also be considered. Unlike conditions in more barren areas, high ground is not necessarily important; from the heights the possibility of controlling or observing trails or critical approaches through the valleys is rather remote.

23. Avenues and Routes of Approach

It is not possible to provide a formula for deciding the approach route that would serve the needs of the commander best. If he has a choice, his immediate needs and the time/distance factor will guide him in his decision as to routes for movements. Consideration should be given to the fact that in any movement security is of major importance. Although the terrain may permit movement along trails, ridgelines and valleys, normally these routes will be guarded by enemy forces. On the other hand, while travel across ridgelines and valleys will normally offer more security, it will be much slower and extremely tiring for the troops, especially so if large quantities of food and ammunition are to be carried.



Figure 26. A jungle clearing. When these clearings are encountered deep in jungle they should be considered danger areas. They should be plotted on the map as they are potential helicopter landing areas and can be used for artillery registration if plotted accurately.

CHAPTER 3

JUNGLE TRAINING

Section I. THE INDIVIDUAL

24. General

A practical appraisal of the abnormal difficulties inherent in jungle operations will reveal that the only remedies for such conditions are training and experience. Unless, however, experience is based on sound, thorough, realistic and constant training it is liable to be quite costly. Therefore, the individual soldier and operational units should be prepared to live and fight in jungle environment before such a mission is actually assigned. Training conducted in actual jungle constitutes the ideal training situation; however, application of guidance herein described, in areas other than the jungle, will benefit the soldier, in event jungle areas are not available. Under circumstances of the nonavailability of jungle terrain, commanders must employ vigorous and imaginative approaches to training for jungle combat taking advantage of the opportunities offered by dense woods, river beds, swamps, marshes or thickets for training purposes. Application of night fighting techniques when utilizing conventional or relatively barren terrain for training will prove to be quite effective in simulating the reduced ranges of assault, restricted movement, and control difficulties imposed by the jungle.

25. Initial Training Objectives

a. The first concern of commanders who are faced with the task of preparing individuals for jungle combat is the physical and mental acclimation of troops to the oppressive jungle environment. Psychological conditioning and knowledge imparted through sound instruction are the only means to eliminate the common fear of snakes, insects, animals, and unknown, foreboding terrain. Troops must not only be physically hardened; in addition, they must be able to adjust to weather, climate, and temperature changes to be expected when de-

ployment to wet tropics from temperate areas takes place.

b. The objectives of jungle training are to prepare the individual and unit to function effectively in jungle environments. Training situations should be created which require execution of missions by small units operating independently. Control of units should be decentralized requiring reliance upon the junior leaders and even the individual soldier. Training should demand individual self-reliance, teamwork, skill, and determination on the part of participating troops. The scope of the training program should extend from survival of the individual in the jungle, to participation of units in combined operations.

26. Acclimation to Heat and Humidity

a. General. One of the secrets of successful training or fighting in a wet tropical climate is the knowledge and proper use of information regarding the acclimation process of the body, heat disorders, and basic heat rules. It must be emphasized that understanding and remembering this information are not enough; only by proper use of this knowledge can troops avoid becoming heat casualties.

b. Heat. Heat is a physical form of energy generated through combustion, chemical action, or friction. There are two types of heat which are of interest to the soldier, the heat of the environment caused by the sun, and the heat of the body generated by converting food into energy. The normal temperature of the human body is between 98° F and 99° F depending on the individual. When excess heat acquired by the body from the environment or from energy producing foods is not dissipated, and this internal temperature departs significantly from normal, serious sickness or even death will result. The human body dissipates ex-

cess heat in three ways: conduction, radiation, and evaporation. Conduction of body heat occurs when the temperature of the air is less than the body temperature. Radiation of body heat occurs when the surface temperature of surrounding objects is lower than the surface temperature of the skin. Normal responses to heat stresses are dilation (enlargement) of the blood vessels and an increase in the rate of heartbeat. These adjustments increase the temperature of the skin and thus increase heat loss through conduction. When radiation is not sufficient to maintain the normal body temperature, the activity of the sweat glands increases and evaporation of the perspiration from the surface of the skin becomes the most important means of cooling the body.

c. *The acclimation process.* Acclimation can be defined as the adaptation by the individual to work in the heat with maximum efficiency and least discomfort. If the body does not become accustomed to heat, the individual becomes irritable and sluggish and is unable to sleep. In general, the performance of this individual becomes substandard and inefficient. Some soldiers may never become acclimated but, fortunately, the percentage is very small. The acclimation process is automatic. The ease and rapidity with which the body becomes acclimated depends upon several variables. One such variable is the degree of temperature change between the two climates involved. Troops going to the wet tropics from a southerly location in the mid-latitudes will become acclimated easier and faster than troops from a place farther to the North. A similar condition would exist if such a move is made in the summer instead of the winter. A second variable is the abruptness of the change from one climate to another. Troops who are transported to wet tropical areas by surface transportation will not experience as much discomfort when they arrive as would troops who are transported by air.

(1) *Characteristics of the acclimation process.*

- (a) Acclimation begins the first day of arrival in the wet tropics and is well developed by the fourth day.
- (b) As the process continues, sweating increases and begins more readily, but salt loss becomes less.
- (c) Physical exercise speeds the acclimation process by inducing profuse sweating.
- (d) The body will remain acclimated from

one to two weeks after departure from wet tropical environment.

(2) *Proper clothing for the acclimation process.*

- (a) Clothing must fit loosely. Tightly fitted uniforms will become saturated with sweat and will hinder the cooling process of evaporation and air circulation around the body.
- (b) One loose layer of clothing is the most effective dress for the jungle as it affords some protection from brambles and insects and allows rapid evaporation of sweat.

27. Heat Disorders—Prevention and Treatment

a. *General.* Heat disorders are a serious problem in the wet tropics. The best defense against this potentially fatal threat is knowledge. Troops must know what these disorders are, what causes them, how to prevent them, and how to recognize the symptoms as evidenced by a victim. Of special importance is the individual soldier's ability to render effective treatment either to himself or to others in event of occurrence of these disorders.

b. *Dehydration.* Approximately two-thirds of the human body is water. If water is not replaced as it is lost in exposure to heat, the body becomes dried out—dehydrated. Individuals become sluggish and listless as this condition develops.

c. *Heat Exhaustion.* After dehydration the most common heat disorder is heat exhaustion. It is caused by excessive loss of water from the body. Symptoms of heat exhaustion are headache; confusion; dizziness; drowsiness; weakness; incoordination; loss of appetite; vomiting; visual disturbances; rapid, weak pulse; and cool and wet skin. To treat a victim of heat exhaustion, remove him to a cool, shaded place for rest; elevate his feet to improve circulation of the blood and give him salt solution (two salt tablets, well crushed, dissolved in a canteen of cool water) to drink. Prevention is much easier than treatment; make sure that there is ample water available and that troops drink enough to avert heat exhaustion. During normal operations, soldiers should drink from 6 to 15 canteens of water a day, depending on how much the individual sweats. At temperatures of 100°–200° this should change to as much as 25 canteens per day. Water must not be rationed in training. There

are ample sources of water in the jungle to provide sufficient water during actual operations; however, troops must not be allowed to drink water from these sources without purifying it.

d. Heat Cramps. A third type of heat disorder is heat cramps. Heat cramps result primarily from excessive loss of salt from the body. Severe and painful muscle cramps are the symptoms of this disorder. A victim suffering from heat cramps should be moved to a cool place and treated as prescribed for heat exhaustion. Salt leaves the body through sweat and urine. It is when salt is not replaced that heat cramps occur. The way to prevent heat cramps is to insure that troops take salt tablets with water, at the rate of two salt tablets per canteen of water, but not to exceed six tablets per day. Salt tablets now issued are coated so that they no longer produce the gastro-intestinal disorders of formerly used salt tablets.

c. Heat Stroke (Sunstroke). This major heat disorder is a serious condition with a high mortality rate. Heat stroke is caused by a breakdown of the body's heat regulating mechanism, and is particularly prone to occur in individuals who are not acclimated to the heat. The individual may absorb heat from the ground and air. The symptoms are: headache, nausea, dizziness and, most important, a hot, red, dry skin. There is an absence of sweating. A heat stroke victim must receive prompt attention or he will die. Cool him immediately. Put him in a creek or stream; pour canteens of water on him and fan him; use ice if it is available. The victim's temperature will rise very high (106°–110° F) and the brain will literally bake in the skull unless the temperature is lowered immediately to at least 102° F. As soon as possible, evacuate him to medical aid. Every soldier must know the symptoms of heat stroke and how to render prompt and proper treatment.

f. Basic Rules for Prevention of Heat Disorders.

- (1) Troops should drink plenty of water. Each individual will need from 6 to 15 canteens of water daily during normal jungle training or operations.
- (2) Soldiers must become acclimated. The acclimation process must be understood and basic principles previously described must be applied. Alternate periods of work and rest for 7 to 10 days until the

acclimation process is completed is recommended.

- (3) Troops should use extra salt with food and water. Both salt and water are needed to prevent all heat disorders.
- (4) Soldiers should eat their heavy meal during the cool of the day if this is possible. Food is the most important source of salt for the body.
- (5) Troops should dress properly for heat. The fatigue jacket should be worn outside the trousers and undershirts should not be worn. This is application of the "single layer" principle.

28. Living in the Jungle

a. General. It is essential that the individual soldier be conditioned to the peculiarities and the unique jungle environment before he is committed to actual combat in this type of terrain. If not properly acquainted with the jungle, troops are liable to become occupied solely with their surroundings and give little attention to the assigned mission. Troops must know how to protect themselves from the elements and difficulties of the jungle, if their fighting efficiency is to be maintained. This is best accomplished by practical survival training which emphasizes the importance of individual resourcefulness, imagination, and determination. The soldier should acquire and apply sound habits to the everyday routine of living when operating in the jungle for extended periods. Jungle operations require independent actions by small units. As a consequence, the soldier must be prepared to care for his own needs.

b. Aspects Affecting Troops Living in the Jungle.

- (1) *Individual uniforms, clothing, and equipment.* Troops conducting jungle operations will usually have to manpack their essentials as normal methods of logistical support will not usually be available. Therefore, each soldier must learn what his requirements for clothing and equipment are, how to keep these requirements to a minimum, and how best to use them.
- (a) *Combat uniform (fatigues).* This clothing is adequate, as issued, for wear in the jungle. To insure maximum cooling of the body, ventilation must carry away body heat. The fatigues, there-

fore, must fit loosely; they should not be "cut-down" or tailored. To aid ventilation, troops should be allowed to wear the jacket on the outside of the trousers. To take advantage of the blending color of the fatigues with the background offered by the jungle, the clothing should not be excessively faded from the original olive green color. Faded and light colored fatigues will outline the wearer's form against the jungle green. Fatigue clothing should also be in serviceable condition. Worn or threadbare cloth will not protect the soldier from insect bites, brambles, and direct sunlight as well as new or heavy cloth. The skin needs all the protection it can be given. Troops should not depend upon a uniform that may tear easily and expose areas of the body.

(b) *Poncho*. The poncho is a raincoat and is issued as such. However, if the poncho is worn as a raincoat its non-porous structure will cause perspiration and will cause the soldier to be more uncomfortable, and wetter, than he would be if he did not attempt to clothe himself against the rain. Also, the vegetation will literally tear the poncho from the wearer's body. By employing the poncho as an expedient it will be found that it has many more useful purposes that will serve troops better. The poncho is very useful in the construction of shelters. Figures 27 through 35 illustrate some of the varied uses of the poncho. The poncho can also be used to gather rain water, as an improvised parachute for material drops and for the



Figure 27. Improvised pup tent constructed from forked sticks and two ponchos.



Figure 28. Hasty lean-to made with poncho and forked sticks.

construction of brush rafts (figs 36 and 106).

- (c) *The jungle boot.* It is light weight and has built-in drainage screens located at the inside arch. These two features aid swimming while wearing the boots. An outstanding advantage offered by the boot is its cleated sole, which aids in negotiating steep slopes and ground covered with wet and decaying vegetation. If jungle boots are not available, cleated soles should be provided on the standard combat boot.
- (d) *The insect (mosquito) bar.* The mosquito bar is a most important item of equipment. Although it is very light it can be bulky if not folded carefully. For efficient packing the mosquito bar should be folded inside the poncho, the roll being as tight as possible. This roll

can then be fastened onto the top of the combat pack with straps, or attached to the suspender harness with light rope if the pack is not worn. The mosquito bar should be utilized whenever troops sleep in the jungle. If conditions prevent construction of a shelter the bar can still be used by tying to trees or brush. Besides providing protection from insects, the mosquito bar will offer protection from bats, whose bites are a potential source of rabies. One word of caution. Troops should not allow any portion of the body to contact the mosquito bar when it is hung, as mosquitos and bats will bite through the net.

- (e) *Gloves.* If available, soldiers should wear gloves when moving through vegetation. Some protection from thorns, brambles, insect bites, and snake bite



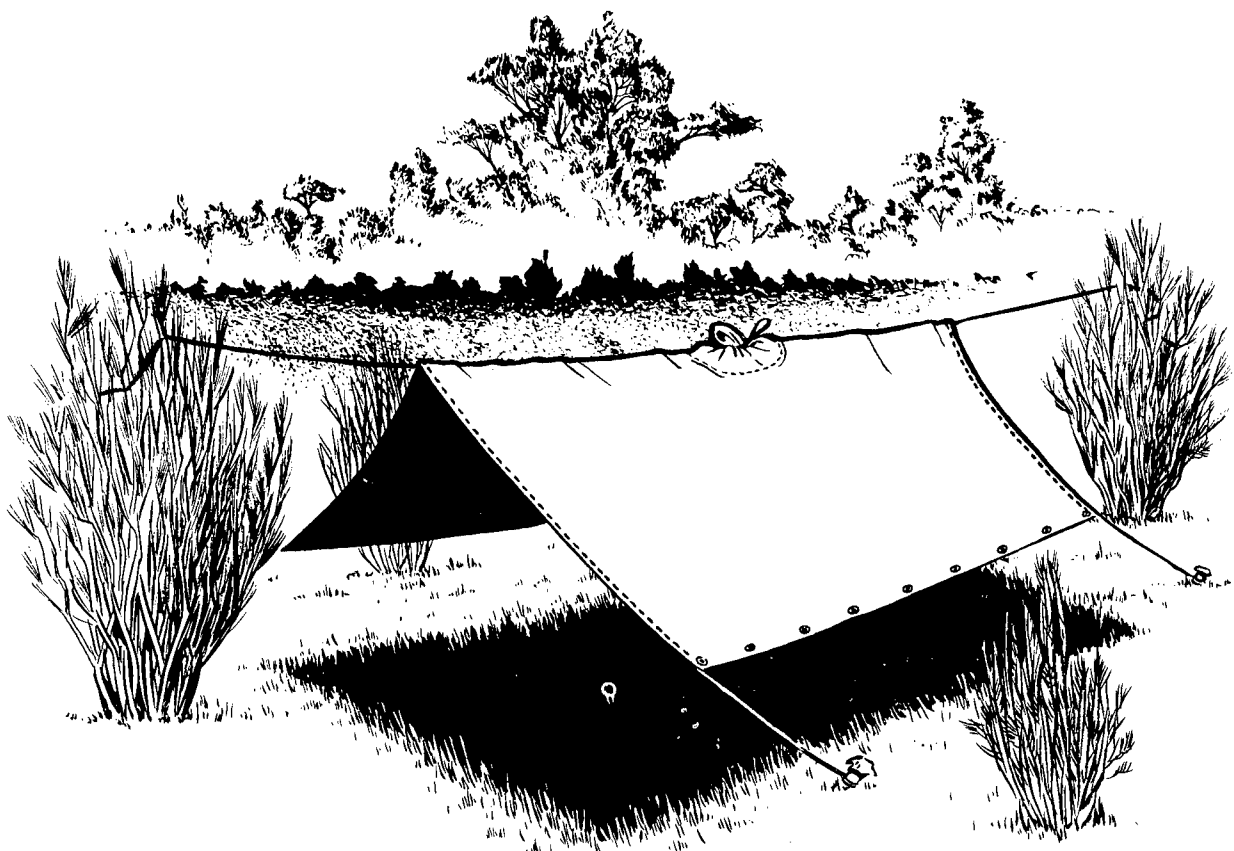
Figure 29. The poncho as an improvised sleeping bag. The poncho should be used in this manner only during the cool of night because its nonporous fabric may greatly increase perspiration.

will thus be afforded. Gloves will also protect the hands from blisters when using the machete for prolonged periods of time and will prevent burns when rappelling rapidly. When not actually needed, they should not be worn, because they will soften the skin unnecessarily.

(f) *Suspenders.* The suspenders issued with the combat pack should be worn when the accouterment belt is worn. Because it is advantageous to travel light, troops should not wear the combat pack except when the mission dictates. As much as possible, individual equipment and ammunition should be worn on the belt. The suspenders will help support the weight by relieving weight from the hips and, as a result, the load will be easier to carry, being better distributed.

(g) *The machete.* The machete is the most important and useful piece of equipment available to the jungle fighter. It is an

effective weapon as well as an excellent cutting tool. The employment of the machete as a weapon can be integrated with other combat training. As a tool, however, the machete shows its worth. To gain the maximum use from the machete, it is necessary to learn and practice the proper grip (fig 37). The proper way to grasp the machete is as follows: take a firm grip on the handle, the power of the grip being asserted by the thumb, the index finger and the third finger; the ring finger and the small finger should be held loosely around the handle; the last two fingers will be tightened around the handle immediately prior to the blade striking the target. Simultaneous with this last action a pronounced "snap" of the wrist will be made. This will increase the power of the strike. To realize the maximum efficiency of the blade, the angle of strike should be 45°. Figure 38 illus-



HUNG FROM BUSHES

Figure 30. Hasty shelter made by suspending the poncho from low underbrush. The simplicity of this shelter allows erection during darkness.

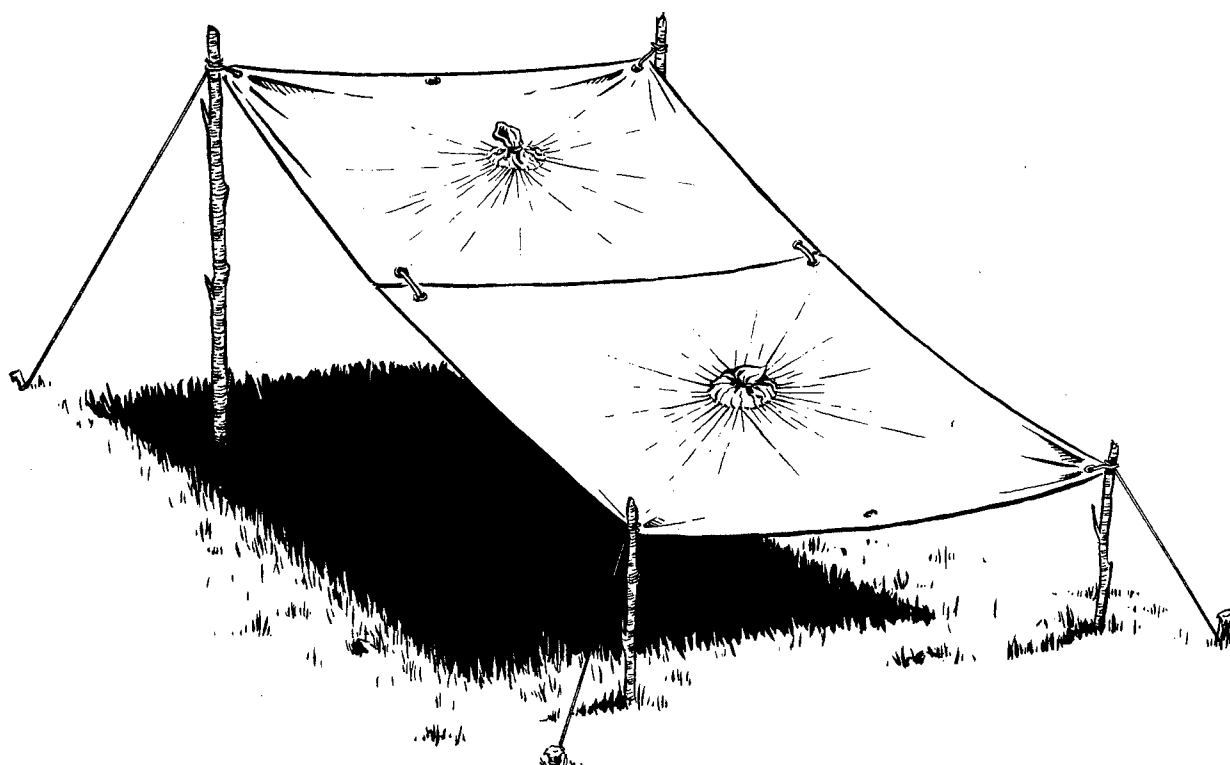
trates this angle. Caution should be exercised to insure that the blade does not strike the target at an angle greater than 45° as the blade will make only a shallow cut. If the target is struck at an angle less than 45° , the tendency is to ricochet. Besides being ineffective, this is very dangerous to the wielder of the machete and to those around him. The machete is also used to cut grass. However, when the machete is employed to do this, repeated blows may be necessary to cut one clump of grass. This is caused by the resiliency of the grass and the resultant lack of resistance offered to the blade. A simple expedient can solve this difficulty. A forked stick will compress the grass so that the blade will cut it. This stick will also flush away

from the user's immediate vicinity any snakes that might be there. Certain precautions must be taken when troops use the machete. Users should not cut towards the body; they should swing the blade away to the left or right. In cutting vines, when making a trail, the cut should always be upward to avoid jerking the tree tops to which the vine is fastened, and thus alerting any enemy observation. Individuals should not work too closely to one another. The back of the blade is thin and can injure, so care should be exercised when the blade is drawn back in preparation for a strike. When not in use the machete should be sheathed. If it must be carried unsheathed, it should be grasped by the back of the blade between the



PITCHED CANOPY FASHION

Figure 31. Hasty shelter constructed with the poncho.



AS A LARGER SHELTER

Figure 32. Two ponchos fastened together in this manner will shelter four men from the rain.

thumb and the index and third fingers. Thus, if a soldier should fall the blade will be dropped and the reflexive action of extending the arms to break the fall will not result in injury. Like any other tool, the machete must be properly maintained.

- (2) *Sanitation and personal hygiene.* In no other type of military operations is sanitation and personal hygiene more important than in jungle combat. Jungle operations place greater responsibility for safeguarding health upon the individual soldier. In jungle areas, units and individuals will not have the protection afforded by the modern sewage and water systems of built-up areas. Each unit will have organic medical personnel, but since the jungle favors operations by small groups operating on their own, every soldier must have at least an elementary knowledge of how to care for his own

health. The characteristics of wet tropical areas favor disease. The warm and humid climate favors rapid reproduction, growth, and spread of disease-causing germs. Most of these areas have a high rate of endemic disease; the primitive sanitation systems compound this condition. All wet tropical areas have great numbers and varieties of insects that spread and carry disease-causing germs. The problem posed by disease in jungle areas has previously been mentioned in chapter 2. A detailed discussion of the types of diseases prevalent in jungle areas can be found in paragraphs 138 through 147.

- (3) *Water.* The very abundance of water found in the jungle can cause many problems if the greatest care is not taken to properly purify it before consumption. There are many sources of water in the jungle. Streams and rivers, water holes,

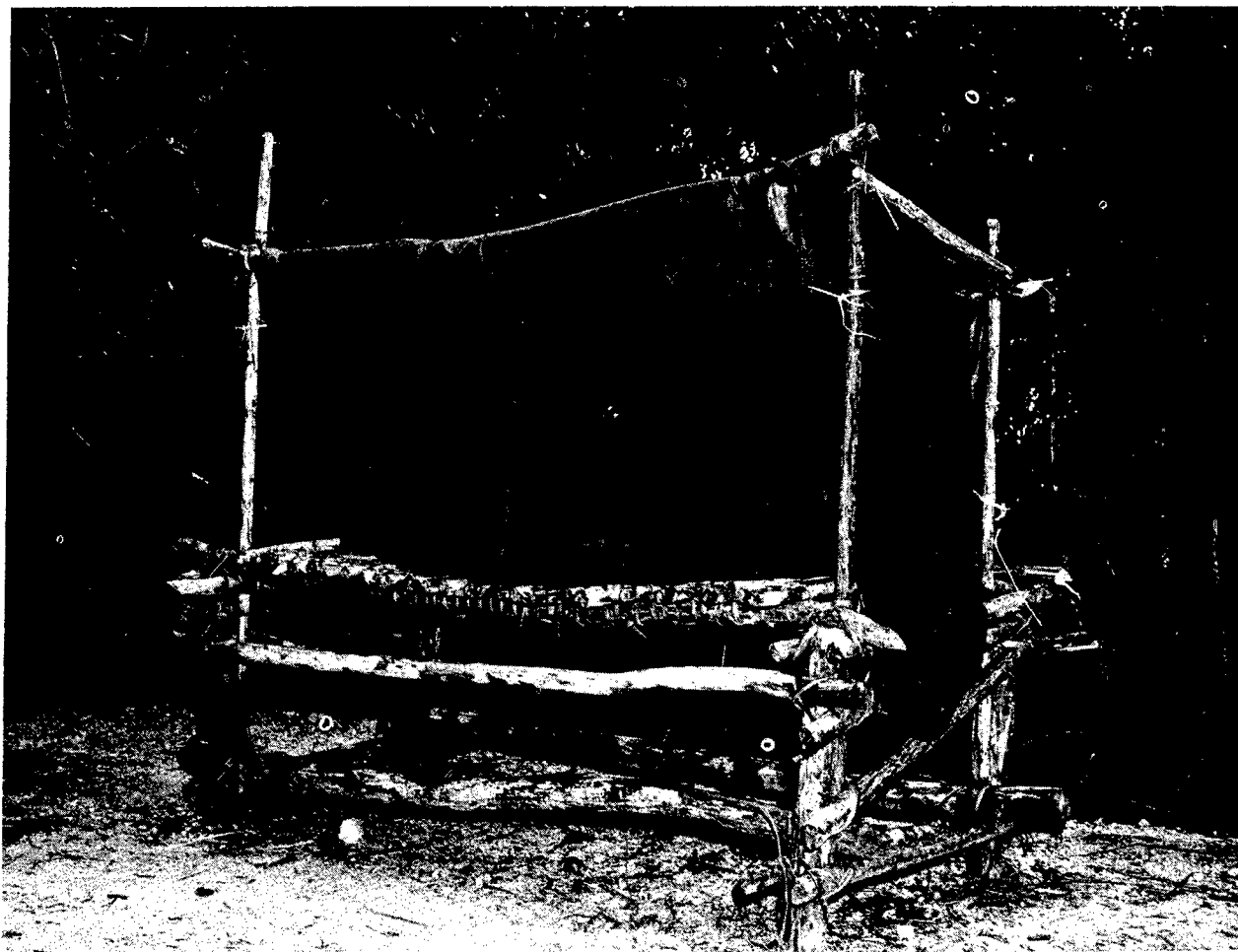


Figure 33. Jungle bed for one man. Poncho may be used as a roof.

and "water vines" will furnish water for the soldier. Actually, there is no such thing as a water vine; any vine can be a source of water if it passes three tests for potability. A segment of large vine should be cut in a length of about three feet. If the sap is clear, odorless, and tasteless, the water is safe to drink. Banana tree stalks, wrung out like a wet cloth, are a source of water. Bamboo saplings have a good supply of water in the lower sections. Rain is a good source of water. However, the jungle canopy is inhabited by thousands of arboreal creatures. Troops should wait for the rain to fall for ten to fifteen minutes to insure that water that falls through the canopy is free from contamination caused by excretion of these creatures. Special care must be taken against water-borne diseases. All water, except

the water from vines, bamboo, and bananas must be purified prior to consumption. Boiling, for at least one minute plus one additional minute for every 1000 feet above sea level, or chemical purification by halazone or iodine tablets, is necessary. Troops should be made to practice these precautions regardless of the area in which they are training or operating.

- (4) *Jungle shelters.* It is essential that troops be able to protect themselves from the elements when they must live in the jungle over extended periods. Sleeping on the ground will cause the soldier to suffer the effects of dampness and from the various insects that inhabit the jungle floor. Therefore, in the course of training, troops should be trained to construct appropriate shelters.

(a) *Types of shelters.* Jungle materials are

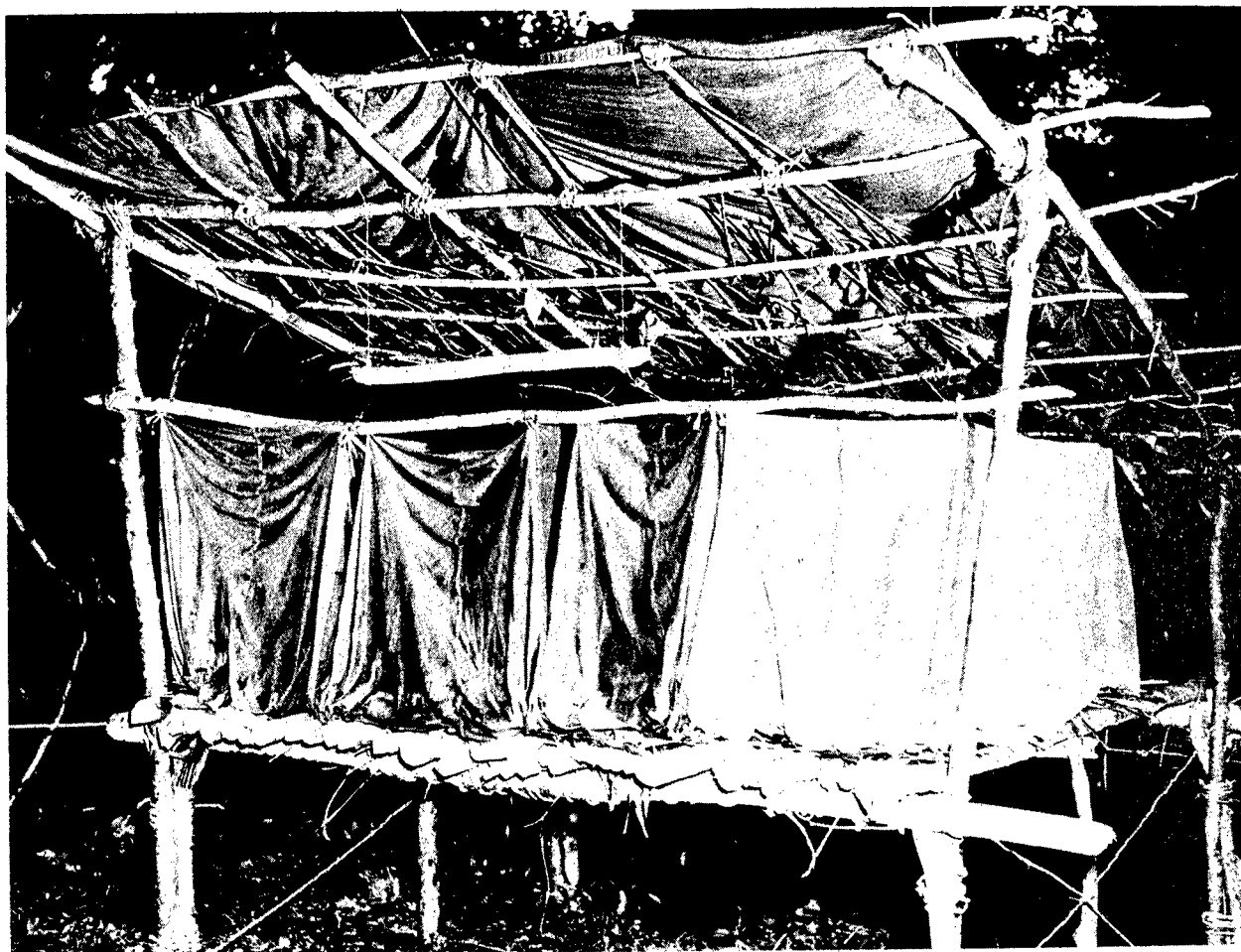


Figure 34. Four-man shelter using two ponchos as a hasty roofing expedient.

available for construction of shelters of many types, the only limitations being the imagination of the individual soldier, restrictions of the tactical situation and time available. Temporary shelters are constructed from a combination of jungle materials and issue clothing and/or equipment. These shelters can be erected with minimum time and labor and are intended to be occupied for short periods. A semi-permanent type, constructed entirely of jungle materials, is more elaborate and requires more labor and time, but can be occupied for extended periods. Figures 39 through 41 show representative examples of the various types of jungle shelters.

(b) *Building sequence.* The building sequence for jungle shelters begins with

selection of the site. High ground should be selected if available and the tactical situation permits because of better drainage, the possibility of a breeze, and, as a result, freedom from a great variety of insects.

(c) *Collection of building materials.* For construction of jungle shelters only living materials of the hardwood variety should be used. Wood that is dead deteriorates very rapidly and is usually infested with insects. For roofing thatch, either banana leaves, palm fronds or other suitable green leaves can be used. These materials are either split for shingling, used without splitting or a combination of both. The most workable combination is palm fronds and banana leaves, if these materials are available.



Figure 35. Jungle mattress. The poncho can be placed on vegetation for protection against insect bites.

(d) *Lashing materials.* The jungle soldier should not use rope, if this has been issued to him, for lashing the shelter together. There are other uses for his rope. The vegetation of the jungle offers excellent lashing materials in the form of vines and inner bark of softwood trees. In selecting the vine, it should be tested by tying a knot in the vine and tightening it. The tighter the soldier is able to get the knot, the stronger the vine. Vines can be used in the construction of traps as well as shelters. Another substitute is the inner bark of softwood trees. To obtain the inner bark, cut the tree at the desired length and peel off a portion of bark. Care must be exercised in separating the inner bark from the outer bark. The thickness of the rope will be determined by the width of the bark and the number of strands used. To make a strong, durable rope, three strips of the bark can be braided together. To do this, first tie the three strips in a knot at one end and then weave the three strips by alternately taking the outer strip and placing it in the center. When the bark has been braided to the end, another knot is tied. This rope can be extended by adding strips at the end, insuring

that they overlap at least two or three inches. Bark rope is very handy in making small ties and in the construction of traps.

(e) *Useful hints.*

1. Occupants of shelters should always hang personal clothing inside the shelter. This will enable clothes to dry and will minimize the chance of insects or snakes crawling into the folds of the clothing. Boots should always be placed inside the shelter also; before a boot is placed on the foot it must be shaken vigorously to dislodge insects or snakes.
2. If the shelter is off the ground the occupant should always inspect the ground before stepping down.
3. The roof of the shelter should be struck several sharp blows before the occupant exits the shelter. Snakes and insects are attracted by sources of warmth, especially at night. Some of these may have found their way onto the roof of the shelter.
4. Upon awakening, the shelter occupant should carefully inspect the area in the immediate vicinity of his body before moving; some snakes and insects are alarmed by sudden movement.
5. Soldiers must keep shelter areas me-



Figure 26. Brush raft made from green vegetation and two ponchos. Lashings are taken from the inner bark of a softwood tree.

ticularly clean at all times. All waste materials must be promptly buried. Even water that has been used for washing or shaving must be placed in a sump. The oils from the skin that are washed away by this water will attract ants; ants will attract lizards, lizards will attract small animals and small animals attract snakes.

- (f) *Traps and snares.* Wild game abounds in jungle areas. Traps should be set along game trails, feeding areas or watering places at sundown. The soldier should avoid disturbing the immediate vicinity of the trap. The trap should be checked at dawn; if delayed, predatory animals will usually rob the catch. Each soldier should become proficient in the construction and erection of traps as described in FM 21-76. Figure 42 shows one of the more easily constructed trap and trigger devices.

29. Tropical Plants and Foods

a. *General.* So much has been written about the dangers and discomforts of jungles that the fact that more people live in them than in any other tropical environment is often overlooked. The tropical areas of the world are particularly well supplied with plant, fruit, and nut species. They vary greatly in flavor, shape, quality, and season of maturity. The principal factors that affect plants and fruits are elevation, rainfall, sunlight, humidity, soil, and winds. There may be occasions where individuals or small groups will be required to live off the land for considerable lengths of time while accomplishing their mission. It is beyond the scope of this manual to cover all the plants and foods found in the wet tropics. Only a few of the more easily identified edible plants and foods, a few poisonous plants and foods, and some general rules on how to recognize the various kinds of foods which are common throughout the tropical areas will be discussed. In the course of training, troops should be exposed to the prospect of depending upon wild produce for subsistence. By thorough familiarization with this aspect of survival, troops will

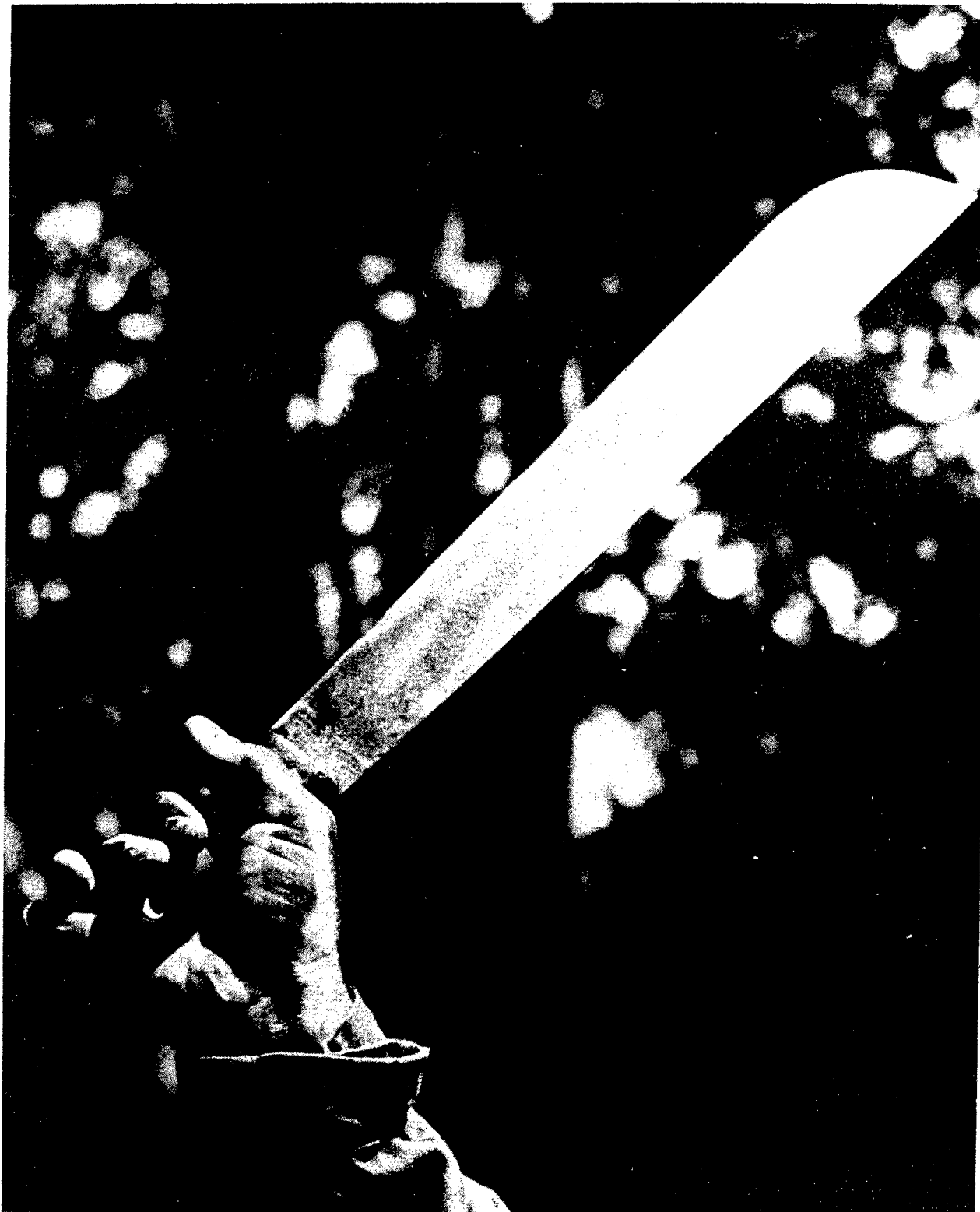


Figure 37. Proper initial grip on the machete handle.



Figure 38. Cutting a sapling with the machete employing the correct grip, snap of the wrist and angle of strike technique. The "break" of the wrist has increased the velocity of the blade to the degree that it was not caught in flight by the camera. Note the complete severance of the tree.



Figure 39. Four-man jungle shelter.

not only become more efficient but self confidence will increase. This will do much to dispel many misconceptions about the jungle.

b. Finding Food. Many of the foods discussed here will not be found growing in the jungle itself but will be found in cultivated or semicultivated lands and in secondary growth areas. The secondary growth areas, as mentioned previously, are areas that were once cultivated and subsequently abandoned. Many foods, once cultivated, can be found in these areas.

c. Citrus Fruits. Throughout the tropical and subtropical areas the citrus fruits are found in great quantity and varieties. However, they are all quite similar to those found throughout the temperate zones. There are numerous species of oranges, lemons, limes, grapefruit, and tangerines. They are basically a cultivated crop but after years of neglect

in secondary growths some trees can be found still producing fruit. They usually are of poor quality, thick skinned, sour, small in size, and grow sparsely on a tree. All citrus fruits are eaten in the conventional manner; however, in an emergency they can be eaten green but will taste quite sour or bitter. Some nourishment can be had by making a tea out of the leaves of the lemon and lime trees. Figures 43 through 47 show some of the wild citrus fruits common to the tropics.

d. Other Edible Fruits.

- (1) *Banana.* The banana (*musa sapientum*) is the most prolific food crop and is grown in most tropical areas. Many species and varieties can be found. The banana grows on a plant that is from 10 to 20 feet high and has large, long, broad leaves protruding from the head or top of the stem



Figure 40. Thatched hut. This is an excellent semipermanent shelter. A smoldering fire can be maintained under this shelter to drive away insects at night. Note placement of split palm frond ribs as seen through the entrance.

(trunk) of the plant. The fruit is borne on a stalk which is made up of from 5 to 20 hands with 12 to 15 fingers to each hand. At the end of the stalk there grows a purplish terminal bud or flower. The stalks grow so that the fingers on the hand point upwards. When ripe, the banana may be green, yellow, brownish or red in color (fig 48, 50, 51, 52 and 53). When ripe, they may be eaten raw. If only green bananas are available they may be cooked and made into excellent potato substitute. The tender portion of the inner stalk or trunk, near the root, has a high starch content; it also may be cooked and eaten. The purplish terminal bud (fig 48) may be boiled like cabbage and it can be eaten as a vegetable substitute. Occasionally a

bud of the bitter variety will be encountered. In this case, the cooking water must be changed a few times; the bitter, harmless tannic acid will then disappear.

- (2) *Plantain*. Plantain (*musa paradisica*) can be safely eaten in the raw state when ripe, but must be cooked when green. Plantain is usually cooked and used as a potato substitute. It can be prepared in as many ways as potatoes. The plantain grows on a plant that is almost identical to the banana. The easiest way to distinguish between the two plants is that the stalk of plantain has only a few hands with 3 to 6 fingers on each hand. The hands as well as the fingers are spaced further apart than the banana. The finger of a plantain is much larger than a finger of a banana. Figures 49 and 50 illustrate this difference.



Figure 41. Semipermanent shelter for a rifle squad.

- (3) *Mamey*. The Mamey is a compact, erect, tall tree with dense, dark green, glossy, oval leaves 5 to 8 inches long which grow clustered towards the top or crown of the tree. The fruit is round, 4 to 6 inches in diameter, brownish in color, with firm yellow to reddish flesh. It is good tasting and is flavored somewhat like a clingstone peach. The fruit has a definite projection or nipple. It contains from 1 to 4 large, rough seeds. It may be eaten raw when ripe or stewed with sugar. The green mamey should be cooked prior to being eaten. The mamey (*Mannea Americana*) is found in the West Indies and in the American tropics. It is found cultivated and wild in the mountainous regions.
- (4) *Mango*. The Mango is considered to be the apple of the tropics. There are literally

hundreds of varieties and species of Mango (*Mangifera Indica*). They are native to the Himalayan mountains and today are found in a cultivated and a wild state in all tropical areas of the world. They are generally the same shape but differ in size, color, and taste. Mangoes will weigh from a few ounces to over a pound and vary from green, brownish, bluish, yellowish, purplish, or reddish in color. It is possible for the mango to be a combination of colors. The mango is sweet with a yellow/orangish, stringy pulp and a very large seed. Most mangoes have a taste that suggests a tinge of turpentine. The thick peeling should not be eaten since it contains a substance that will cause some people to break out in a rash. In addition, peelings of the poorer varieties contain a purgative

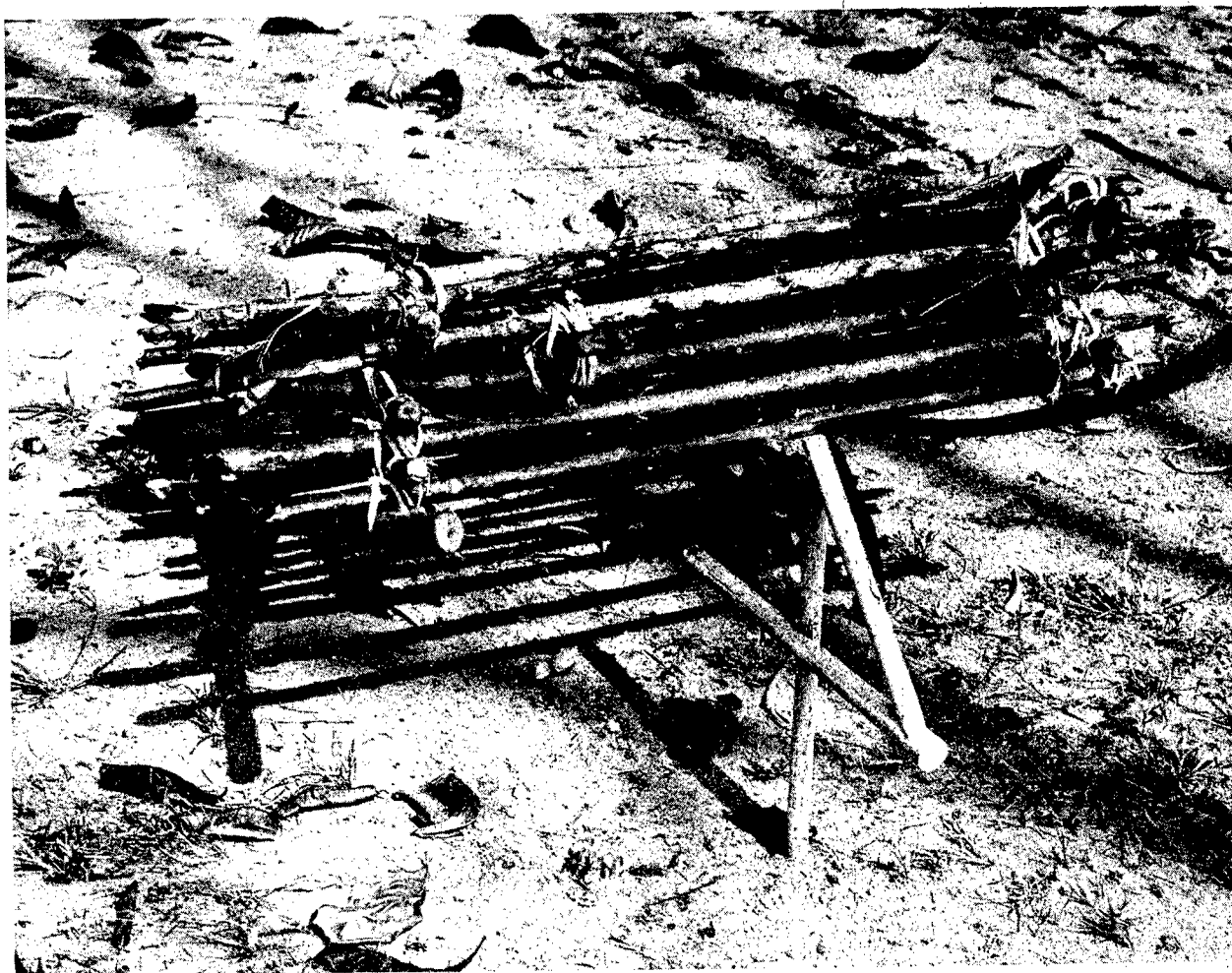


Figure 42. A box fall trap. Photograph shows details of trigger 4 device.

agent. The mango tree grows to a height of about 35 feet. It has dark green, somewhat leathery leaves, from 4 to 6 inches long. Figure 54 shows a type mango.

- (5) *Papaya*. The Papaya (*Carica Papaya*) grows on a tree-like plant which is soft-stemmed and unbranched. The tree grows to a height of from 6 to 20 feet. The large, dark green, many fingered, rough edged leaves are clustered at the top of the plant. The fruit grows on the stem clustered under the leaves. There are several varieties which differ in size, shape, and flavor. The most common are similar in shape to a small watermelon. The fruit averages from two to eight pounds, but some species grow much larger. The skin varies from a greenish to a yellow color. The meat or pulp can be orange or red when ripe, and can

be eaten raw but should be cooked like a vegetable when green. The center of the fruit is hollow with many black, rough seeds clinging to the inside wall of the pulp. The papaya is found cultivated and wild. The wild variety usually has very small fruits measuring about 2 to 3 inches in diameter. Although the papaya is native to the New World tropics, in recent years it has spread throughout the tropics. Soldiers should be extremely careful while picking or preparing papaya. The slightest cut will cause a milky sap to flow from the rind as well as the plant itself. The commercial meat tenderizer and digestive enzyme (Papain) is derived from the milky sap. If this sap should get into the eyes, it could cause temporary or permanent blindness. Some natives wrap meat in the

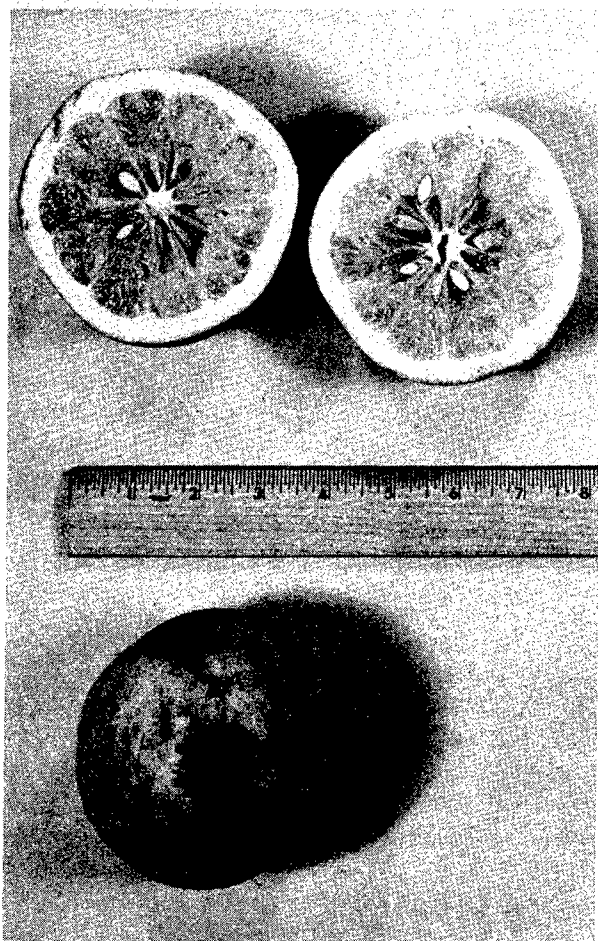


Figure 43. Wild sweet orange. This fruit, in common with most wild fruits, has a thick skin.

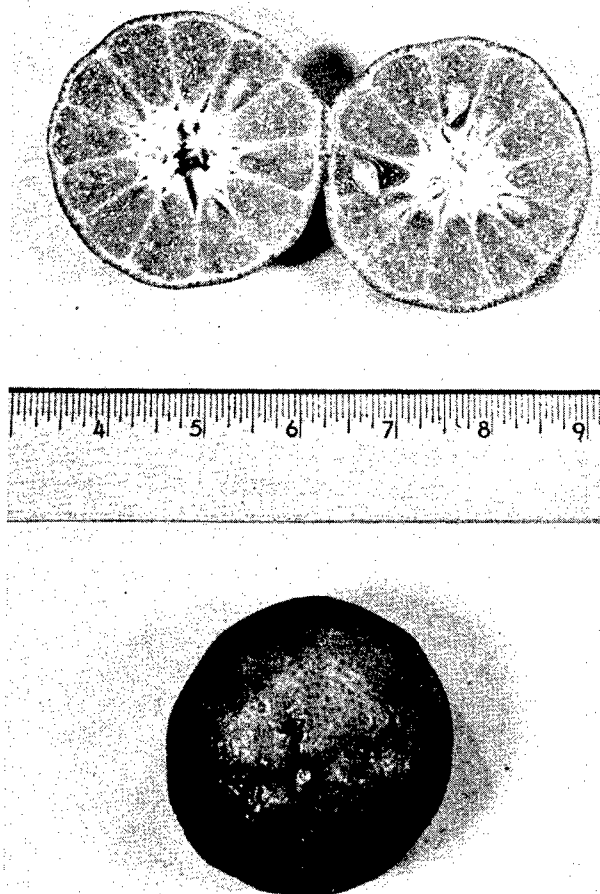


Figure 44. Tangerine.

leaves of the papaya taking advantage of its tenderizing qualities. The papaya is appreciated as a dessert, a salad, and specifically for its digestive and laxative qualities. Figure 55 shows the papaya fruit.

- (6) *Guava*. The Guava (*Psidium Guajava*) is famous for the jelly made from the fruit. It is a yellow, tough skinned fruit with a whitish or pinkish meat containing an abundance of seeds. It grows on a large spreading shrub or small tree. The tree attains a height from 10 to 20 feet. The fruit is about the size and shape of a large crab apple. The fruit can be eaten raw when ripe if one ignores the musky odor. When the guava is green it should be cooked. The tree is easily recognized by

the pale brown bark that is smooth and peels off in thin sheets like paper. Its leaves are light green with fine hairs underneath. The venation is deep on top and raised to prominent veins underneath. Some natives claim that a tea made from the leaves of the guava tree is a good cure for dysentery (fig 56).

- (7) *Sour Sop*. The Sour Sop (*Annona Muri-cata*) is a very curious looking fruit. It is green in color, very spiny and grows as large as a man's head. It may weigh up to 12 pounds. When ripe the sour sop can be eaten raw. The chief use is for making a beverage by crushing the pulp and then adding water or milk and sugar. The sour sop is a good water substitute. The leaves

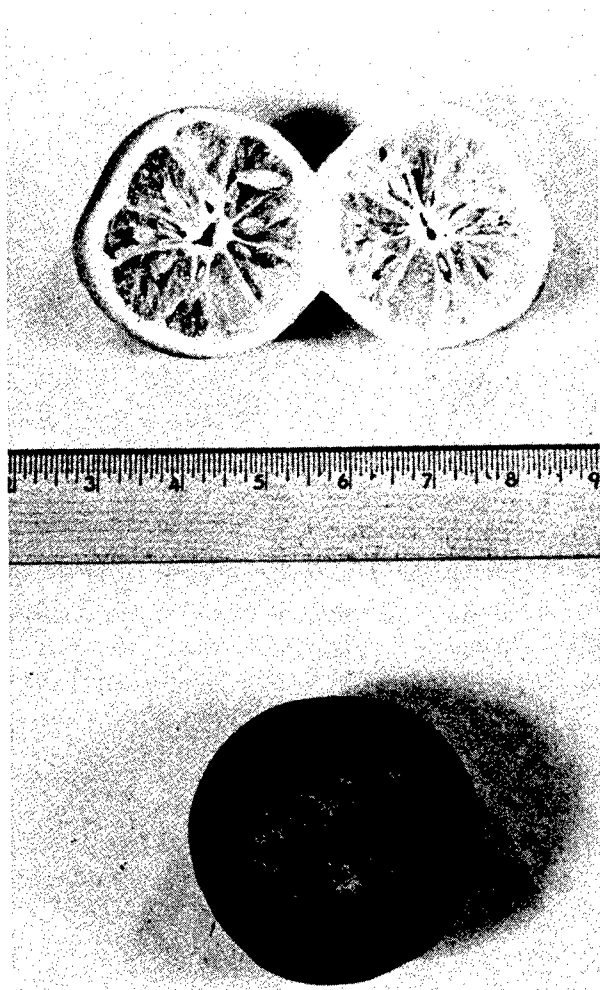


Figure 45. Sour orange.

of the tall, sparse tree are smooth, dark green, and approximately 4 to 6 inches long growing opposite each other. The leaves have a strong scent when crushed. Some natives brew a tea made from the leaves as a cure for an upset stomach (fig 57).

- (8) *Sweet Sop*. The Sweet Sop (*Annona Squamosa*) is a cousin to the sour sop. This small tree with simple, oblong leaves has a fruit shaped roughly like a long, blunt pinecone with thick grey-green or yellow scales. The fruit is easily split or broken when ripe, exposing numerous dark brown seeds which are imbedded in the cream colored, very sweet pulp. The sweet sop is always eaten raw and is used in the same manner as the sour sop. The sweet sop,

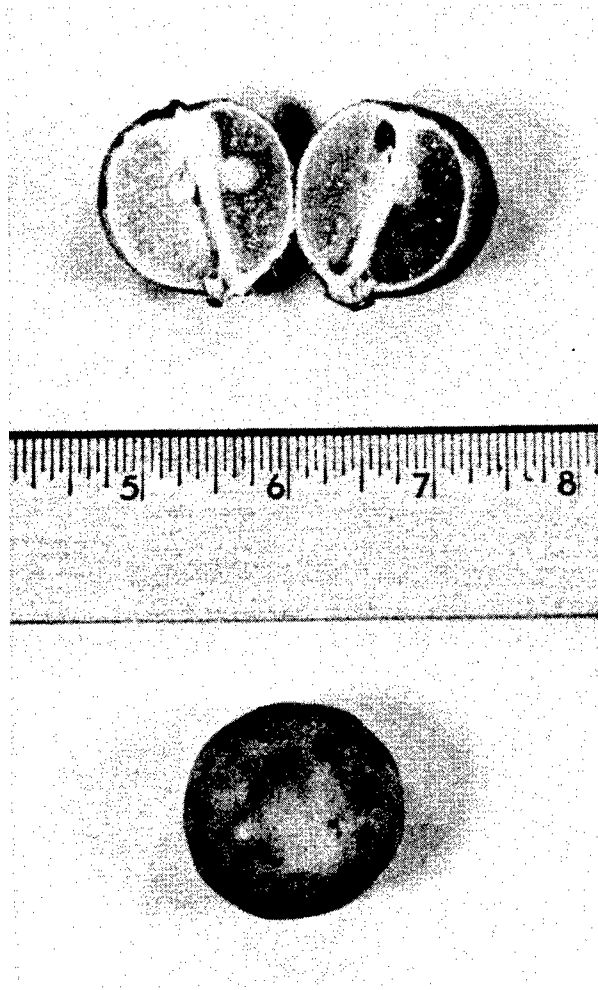


Figure 46. Lime.

like the sour sop, is a native to the American tropics and can be found from Florida in the United States to the northern and eastern South American tropics. It has been introduced into many places in the Old World tropics.

- (9) *Other sops*. There are two other fruits that are kin to the sops. They are the Cherimoya (*Annona Cherimola*) and the Custard Apple (*Annona Reticulata*). The Cherimoya, native to the mountain valleys of Peru, looks similar to the sour sop, but the skin is much smoother. The pulp is less cottony, and more creamy in consistency when it is ripe. It has fewer seeds than the sour sop. The fruit varies in weight from 4 to 16 pounds. It is the best tasting fruit of the Sour Sop family. The



Figure 47. Wild lemon.

Custard Apple is an excellent and substantial fruit of a small tree native to the West Indies, Mexico, and Northern South America. It may be called under the local name "bullocks heart" suggesting its shape and appearance. When ripe it begins to discolor and blacken like the sour sop. At this stage the white or cream colored flesh becomes sweet and aromatic. It has numerous large brown seeds and is always eaten raw. There are many hybrids and varieties derived from the custard apple.

- (10) *Nispero*. The Nispero or Sapodilla (*Manilkara Sapodilla*-*Archea Sapota*) is one of the most common of the tropical American fruits. It originally came from the Yucatan Valley where the wild trees are tapped for their white sap which gives Chicle for chewing gum. Cultivated fruits vary in size, but are usually shaped like a ball about 2 inches in diameter. There are from 3 to 6 glossy, blackish-brown seeds im-

bedded in a brownish, granular pulp. The grayish or brownish skin is smooth and slightly rough in texture. The tree grows up to 60 feet tall and has dark green leaves. The sap is milky but not poisonous. The sap of the nispero is not a good substitute for water. The nispero fruit is eaten fresh only.

- (11) *Ice Cream Bean*. The Ice Cream Bean (*Inga Spectabilis*, *Inga Ingridea*) is often referred to as Inga. It is quite common in wet tropics. The leaves are 6 to 8 inches long, are dark green underneath and light green and hairy on top. The leaves grow opposite each other. The fruit is a bean type pod, about 15 inches long, greenish brown in color. When the pod is broken open numerous sections of whitish soft pulp covering the large seeds can be seen. The white pulp is eaten raw and tastes like watered down vanilla ice cream.

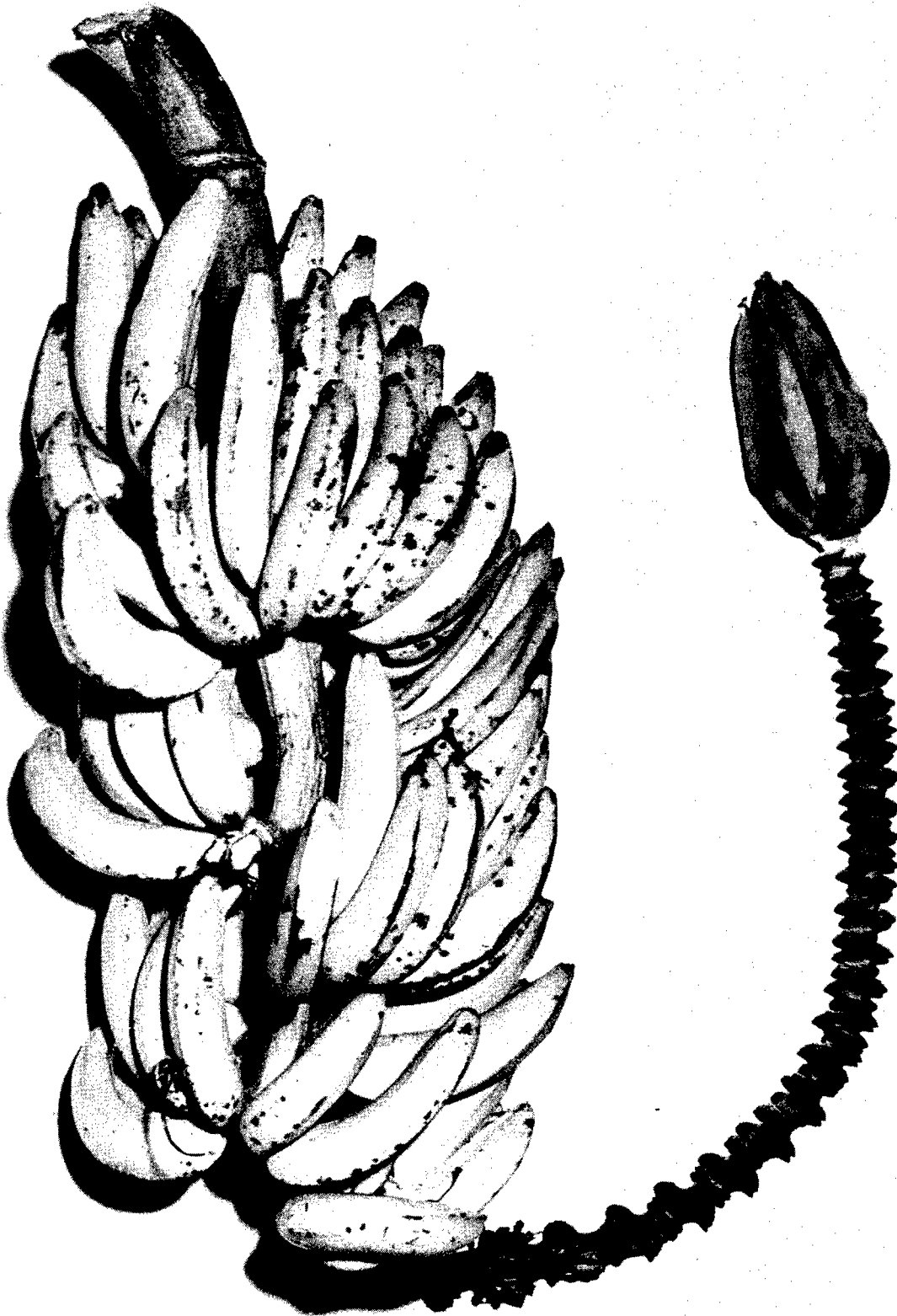


Figure 48. Stalk of cultivated bananas. The purple terminal at the end of the stalk is edible.



Figure 49. The plantain. The large size of this specie of the banana family is one of its most distinctive characteristics.

(12) *Malay Apple*. The Malay Apple (*Syzygium Malaccensis*) has its origin, as its name indicates, in Malaya. It has since been introduced into the Hawaiian Islands and tropical America. The tree attains a height of from 30 to 60 feet and has large oval leaves. On the naked branches of the tree a great profusion of flowers form and are followed by egg or pear shaped fruits. The fruits, waxy in appearance, are rose, striped or white in color, depending upon the amount of sunshine that reaches the fruit. The meat is somewhat dry, insipid, white, and rose-scented. They may be made into desserts and jellies (fig 58).

(13) *Rose Apple*. The Rose Apple (*Syzygium Jambos*) is often confused with the Malay apple. The rose apple is a small garden tree native to Indo-China or Java. The

fruits are round and are from one to two inches in diameter. They are usually whitish or ivory colored. The crisp, white flesh is thin and there is usually a hollow cavity between the meat and the large seed.

(14) *Pineapple*. Contrary to popular belief, the Pineapple (*Ananus Comosus*) is not native to Hawaii but to tropical America. It has become one of the most important tropical fruits and is grown in almost all tropical areas. The plant is basically a rosette of long, stiff, spiny leaves. The fruit is borne on a leafy stalk up the center of the plant. The basic difference between the wild and the domestic fruit is the size, the wild fruit being considerably smaller. The wild pineapple plant also has spiny edges on the leaf, where the much cultivated varieties have

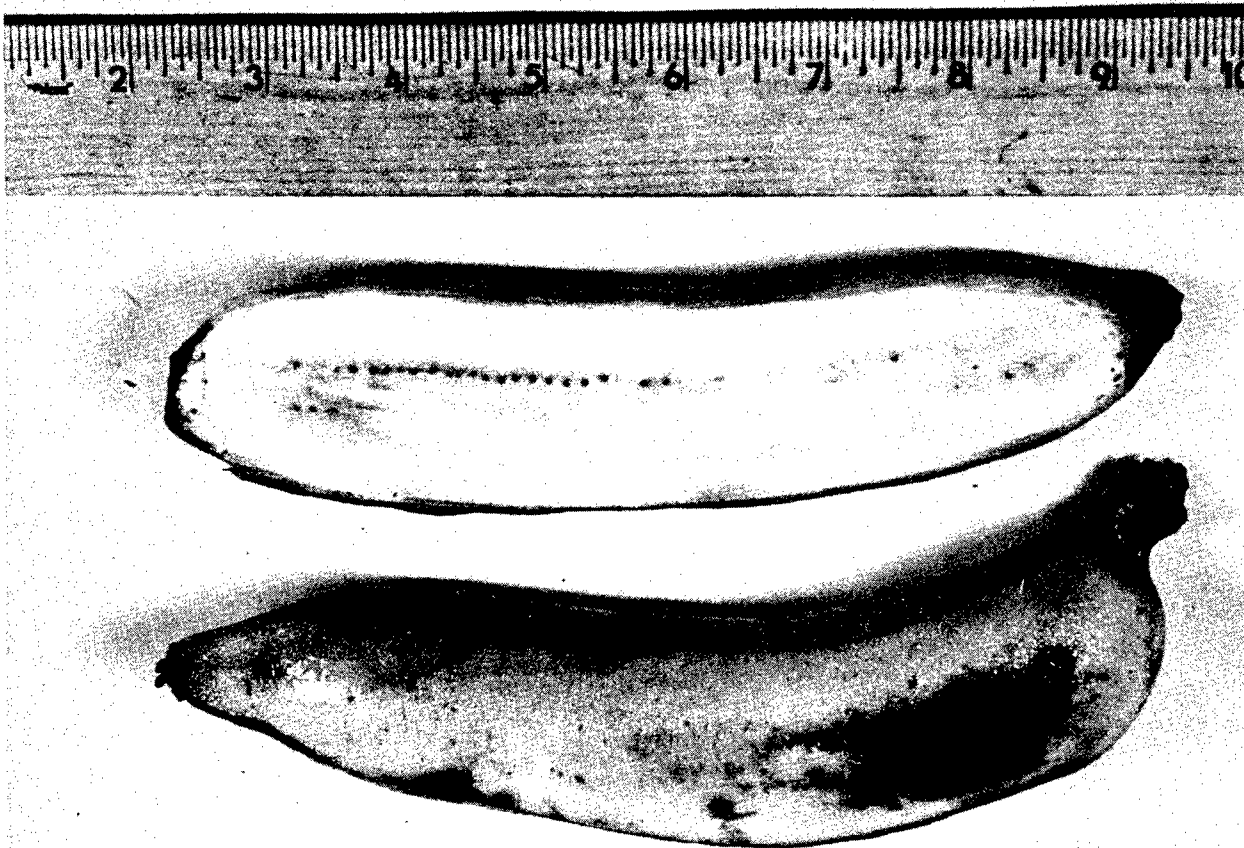


Figure 50. Commercial banana. Compare with figure 49 and note the subtle differences from and similarities with the plaintain.

a smooth edge. Figure 59 shows a wild pineapple.

- (15) *Star Apple*. The Star Apple (Caimito) is common in the tropical forests of the Americas. The tree grows up to a height of 60 feet. The leaves are dark green on top and have shiny, silky, brown hairs on the bottom. The fruit looks like a small apple or plum with smooth greenish or purple skin. The meat is greenish colored and milky in texture. When cut through the center the brown elongated seeds make a figure like a 6 to 10 pointed star. The fruit is sweet and eaten only when fresh. When cut the rind will, like other parts of the tree, emit a white sticky juice or latex which is not poisonous.

- (16) *Sapote*. The Sapote or Zapote (*Calocarpum Mammosum*) is one of the best known fruits of tropical America and closely resembles the mamey. It is cultivated and is sometimes found wild. It is a milky-sapped tree which sometimes attains the height of 100 feet. The fruit is shaped like a ball, 4 to 8 inches in diameter, with rough, brownish skin and pink or reddish meat in which there are imbedded several large, brown, shiny seeds. The fruit is usually eaten raw but is sometimes made into a preserve. The Zapote has a scent of bitter almonds and is used for flavoring purposes. The tree is easily recognized by its size and shape of the fruit. The leaves cluster at the end of the branches, are

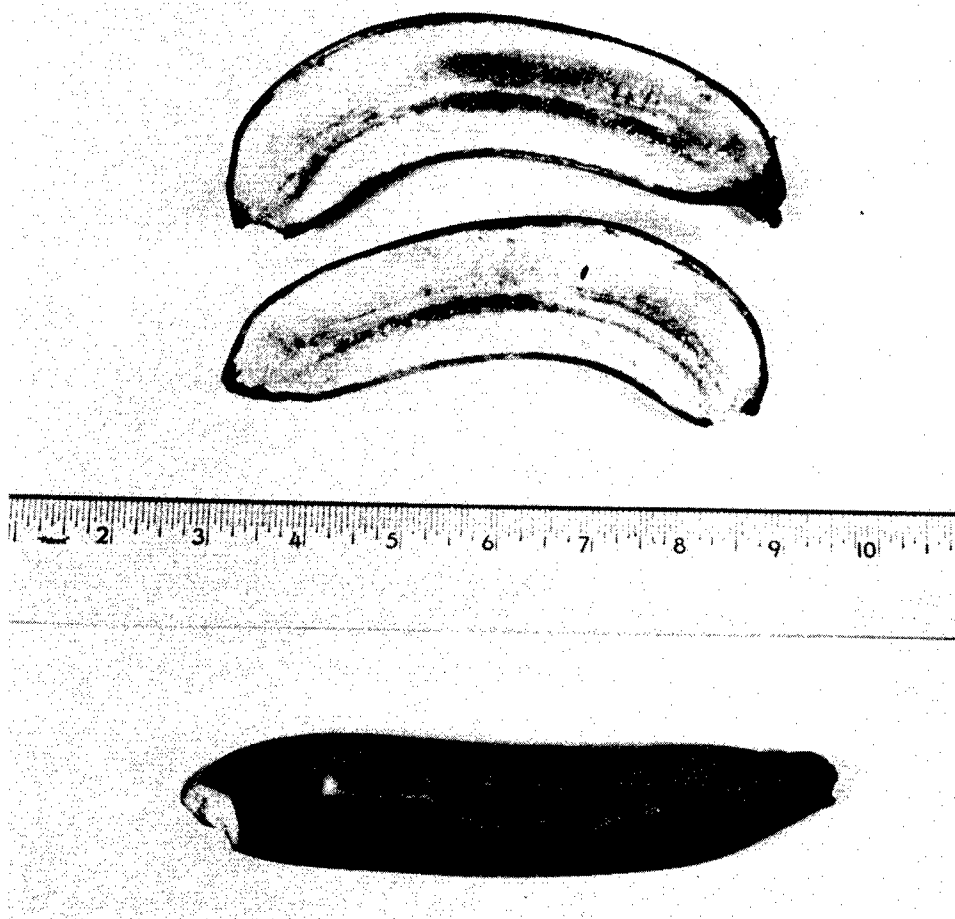


Figure 51. Apple banana. This variety of the specie is quite delicious. The specimen shown is unusually large.

slender and light green in color and are from 6 to 12 inches long.

- (17) *Jackfruit*. The Jackfruit (*Artocarpus Heteraphylla*) is a large, handsome tree native to India and has long been grown in the Malayan tropics. The Jackfruit has since been introduced into the American tropics. It has a simple, dark green, shiny leaf and produces a rough or prickly compounded fruit the size of a large watermelon. The fruit grows on a short stalk directly from the branches or on the trunk proper. The large, brown seeds are edible when roasted. The fleshy, sweetish, yellow pulp about the seeds is boiled. The pulp itself has a very musky odor (fig 60).

- (18) *Sugar Cane*. Sugar cane (*Saccharum Officinalis*) is a well known giant grass grown throughout tropical regions of the

world. It has a sweet juice which is the common source of sugar. It is normally found growing in clumps in secondary growth areas. The soft, juicy stalks can be chewed to obtain the juice. Sugar cane has green to reddish leaves, often striped silvery. It is best to remove the hard outer layer before chewing (fig 61).

- (19) *Hogplum*. The hogplum (*Spondias*) can be found in cultivated and uncultivated areas in the tropics. Usually its color varies from yellow to red and in size from $\frac{1}{2}$ inch to $1\frac{1}{2}$ inches. It grows on trees from 15 to 30 feet high. The fruit has a sweet pungent smell similar to normal plums (fig 62).

e. Edible Nuts.

- (1) *Coconut*. The largest and probably the most common nut found in wet tropics is

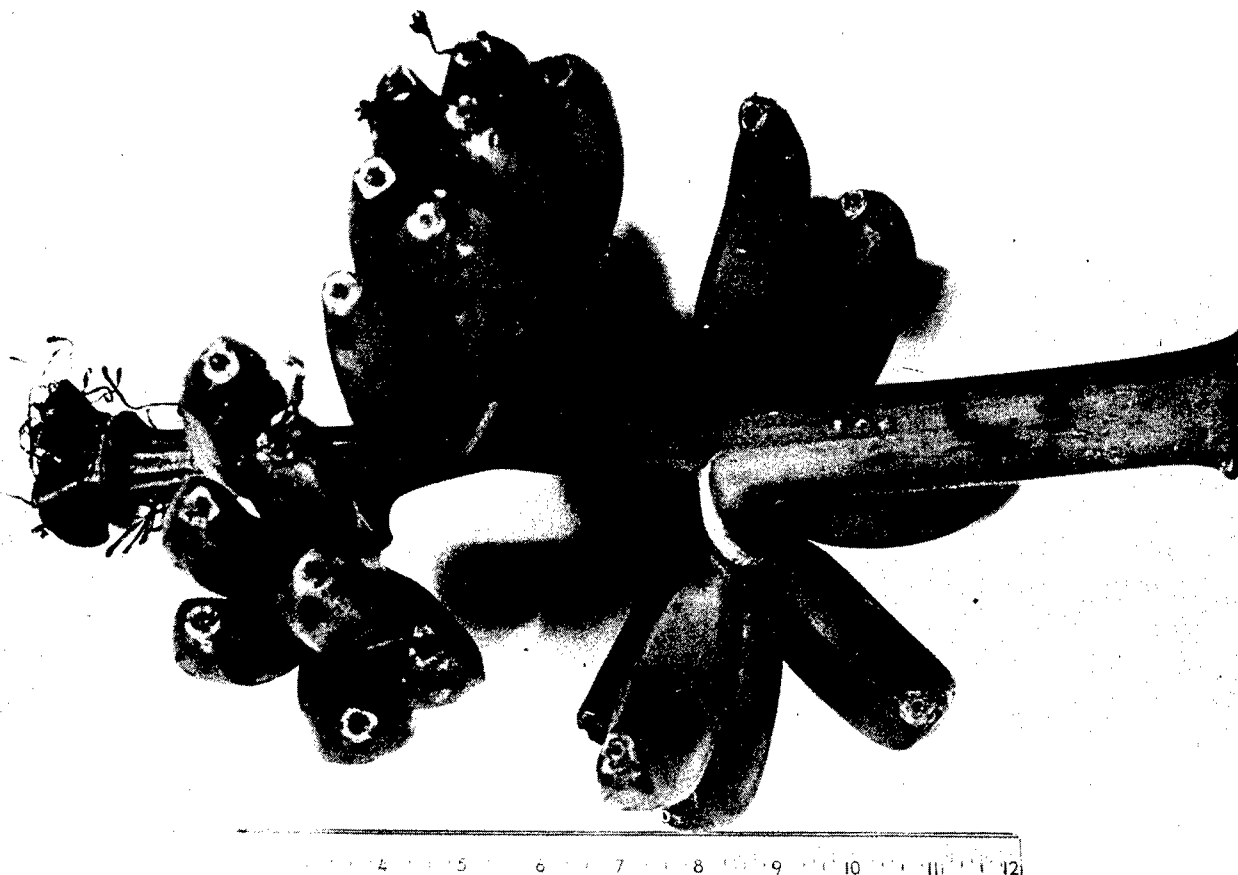


Figure 52. Red bananas.

the coconut. The coconut has three stages of development. It is edible in all three stages but its use will vary depending on the state of its growth. When green, the coconut is an excellent source of water; the fluid is always cool regardless of the outside temperature. The meat is soft and can be scooped out of the shell with a spoon. The green coconut and its water act as a mild laxative and may adversely affect susceptible persons. The ripe coconut produces the copra of commerce. The firm meat is most commonly shredded and used in pastries and candies. In this stage the meat of the coconut is firm or hard. The milk or water of the coconut is less plentiful, stronger in taste, but it is still good to drink. The germinating or sponge coconut is less desirable. In this stage the

meat has fallen away from the inside of the shell and has absorbed the water. The meat is then found in a spongy ball. The nut has started to grow with shoots protruding from the coconut hull. The meat of the coconut is edible in the sponge state; however, there is no water. (Figure 63 shows the coconut in the three stages of development.) To husk a coconut, cut a length of hard wood (iron wood or guava are excellent) about $3\frac{1}{2}$ feet long and 2 inches in diameter, sharpen one end and place the dull end firmly in the ground. Hold the coconut horizontally by two ends and drive it down on the husking stick forcing the coconut downward until all the outer husk is off (the dry husks make excellent tinder). The nut can then be opened by punching a hole or by hitting

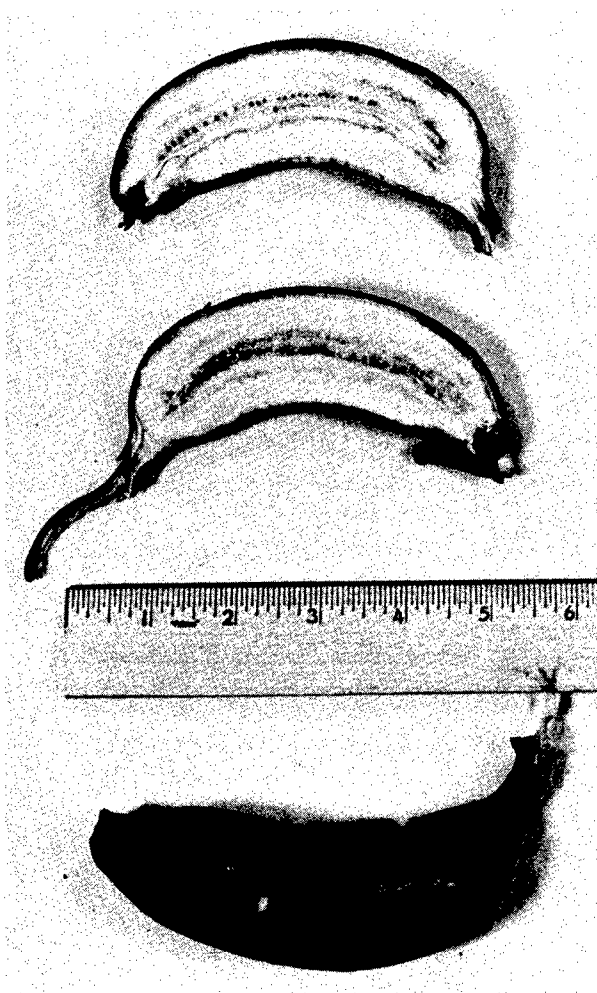


Figure 53. Another view of the red banana.

firmly in the center with a blunt instrument such as the back of a machete.

- (2) *Cashew*. The Cashew (*Anacardium Occidentale*) is a peculiar fruit. It is pear or bell-pepper shaped, reddish when ripe. It is soft, sweet and edible in the raw state. It bears, at the tip, a hard, kidney-shaped nut which is smooth, shiny and green or brown in color (according to its stage of maturity). In this kidney-shaped pod is found a seed which is the cashew nut of commerce. The nut is edible only after being boiled or roasted until all its oil is gone. Troops should avoid the green or brown hull surrounding the nut as it contains an irritant poison which will blister the skin like poison ivy. Caution must be taken when roasting or boiling the cashew

because the steam or smoke can cause temporary or permanent blindness (fig 64).

- (3) *Almond*. The Indian or Tropical Almond (*Terminalia Cutuppa*) is widely dispersed in all tropical countries and is primarily found in cultivated and secondary growth areas. The tree attains a height from 50 to 60 feet. In some areas, it may be as high as 100 feet. The leaves are dark green, shiny and are somewhat tear-drop shaped. Some of the leaves may be red in color. The nut is inside the fruit which forms a fibrous exterior hull. When ripe, the hull can be chewed to provide some nourishment. The seed inside the shell can be eaten raw or roasted. Although this is not the almond of commerce, it is a cousin to the commercial almond and has a similar flavor. The nut is borne on the end of the branch amid a cluster of leaves. When ripe the hull turns a yellowish color. The tree is deciduous and bears two crops annually just prior to dropping the leaves (fig 65).
- (4) *Black Palm*. The Black Palm (*Asiarcaryum Standleyanum*) is quite prevalent in most wet tropical areas. The tree is easily identified in that it has uniform bands of stiff black, needle-like spines protruding from the trunk. It produces an edible fruit and nut. The fruit is ball shaped, roughly 1½ inches in diameter and is orange or red-orange in color. The fruit is sweet and, although stringy, it can be eaten. The nut is oily and is flavored like a coconut. The black palm nut can be eaten raw only. The nut is inside an extremely hard protective shell (figs. 66 and 67).
- (5) *Canna Brava*. Another common palm is the Canna Brava (*Bactris Minor*). This plant is a small palm with stems from 1½ to 2 inches in diameter. It usually grows in clumps and has long, thin, needle-like spines on the stalk. These spines, or needles, grow on the trunk as well as on the palm fronds and are usually brown in color. It is often confused with the black palm. One sure distinction is the fruit. The fruit of the canna brava is purple when ripe, and the clusters are quite small as

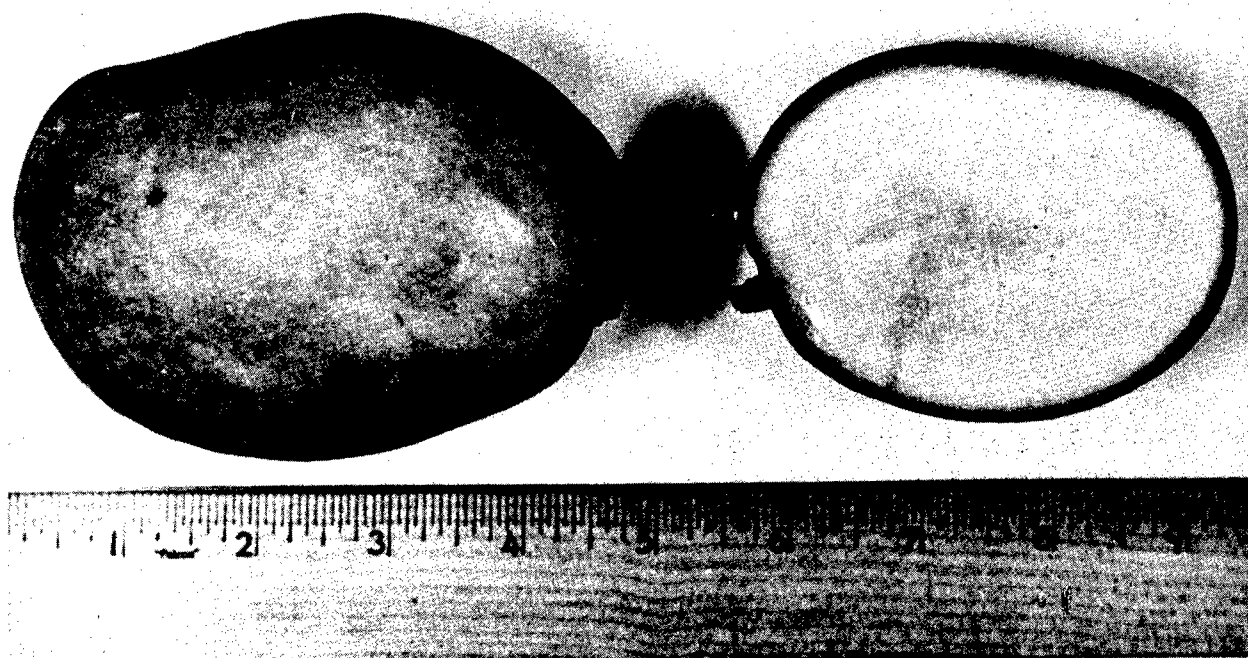


Figure 54. The mango.

compared to the long, hanging bunches of the black palm. The fruit and nut can be eaten raw. Both the fruit, which is fibrous, and the nut, which is coarse, are of poor quality and taste (fig 68).

- (6) *Corozo*. The Corozo (*Scheelea Zonensis*) is one of the most common palms in the American jungles. The trunk may be thick and short or it may be very high, resembling a royal palm. The fronds may be over 30 feet long and up to 6 feet wide. The drooping bunches of fruit are 4 to 6 feet long and grow very close together. The orange colored fruit looks like small coconuts (fig 69). The oil from the nuts must be squeezed out and is excellent for cooking. Like most palms, it has a "heart" or folded, young, unborn leaves near the top of the tree which can be eaten raw or cooked. This "heart of palm" resembles crisp cabbage or heart of lettuce and is a good vegetable substitute (fig 70).

f. *Potato Substitutes*.

- (1) *General*. Probably the most basic food served, in the western world, is the potato.

The potato is not common in the wet tropics; however, potato substitutes take its place in the basic diet of native peoples. One of the most common of the potato substitutes is the plaintain or cooking banana (para 29d).

- (2) *Breadfruit*. The Breadfruit (*Artocarpus Communis*) tree is from 30 to 40 feet high and has enormous dark green, shiny, leathery, many fingered leaves. The fruit, borne on the branches, are green, somewhat scaly and from 4 to 6 inches in diameter. The breadfruit is normally cooked and eaten the same as the white potato but the core and seeds are not eaten. It can also be eaten in its raw state when ripe; simply peel or scrape the outer skin off, separate the pulp from the core and seeds and eat it. The breadfruit is native to the East Indies (fig 71).
- (3) *Taro*. Taro is one of the most common potato substitutes found growing in the wild state in wet tropics. However, it is called by many names. There are almost as many varieties of taro as there are

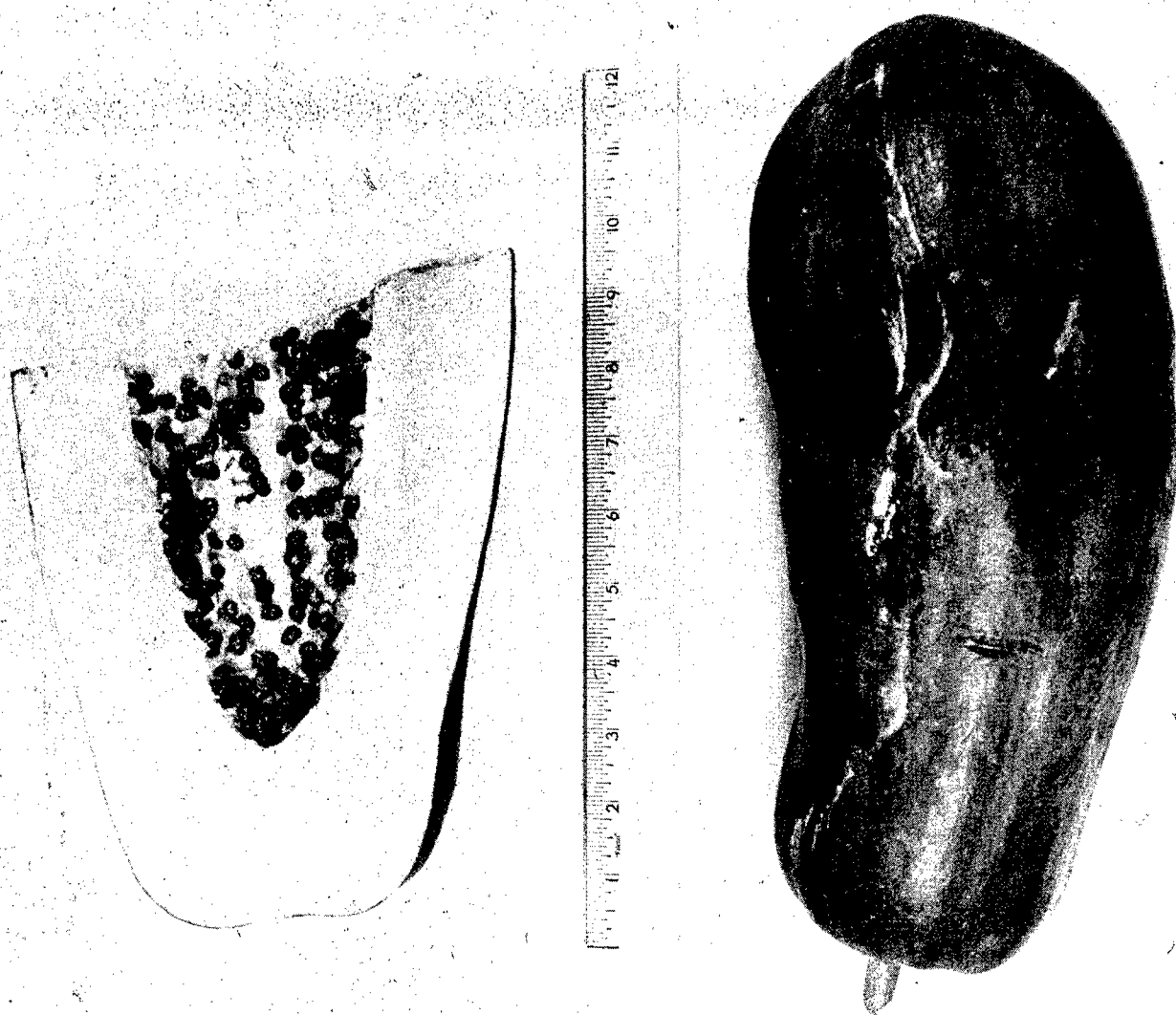


Figure 55. The papaya.

names. Discussion here will be confined to the most common species.

- (a) *Dasheen*. The Dasheen (*Colocasia Esculenta*) is grown for its potato-like tuber. It is eaten in a manner similar to the potato and must be cooked. Dasheen grows wild; however, it is also widely cultivated. The leaves and the tubers contain calcium oxalate crystals which

are poisonous but are destroyed by cooking. The calcium oxalate or oxalate of lime crystals will cause a sharp, hot, burning sensation in the mouth. The crystals are broken down and disappear when heat is applied. The tender leaves of the plant can be boiled and eaten. The plant is from 1½ to 3 feet high with the leaf stem growing from the base of

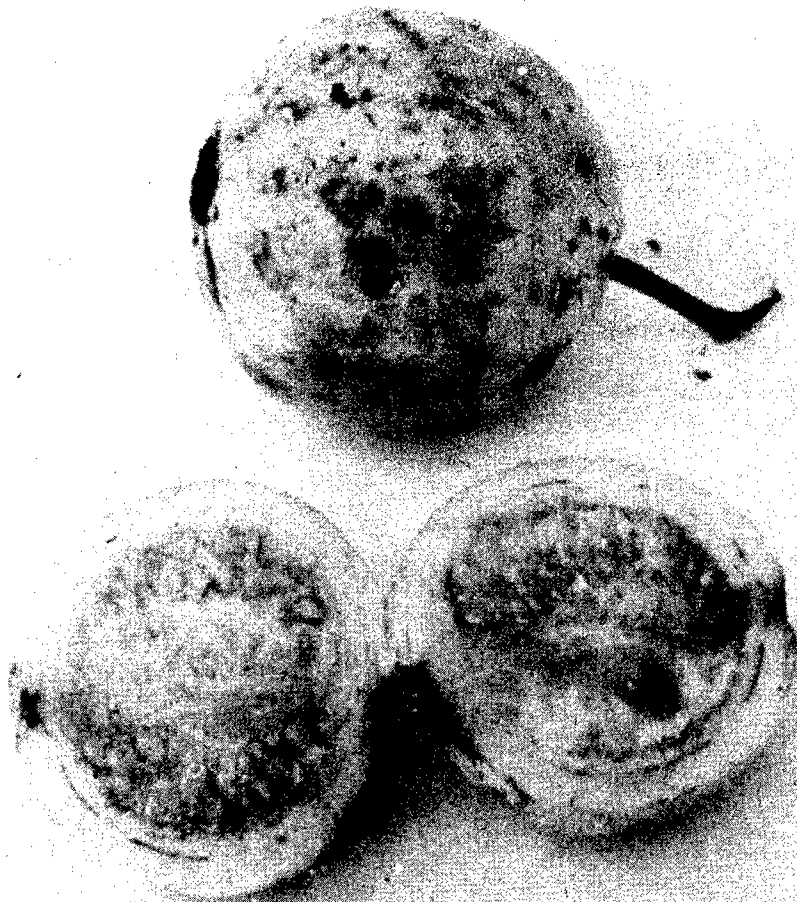


Figure 56. *The guava.*

the plant. The leaves of the dasheen are shaped like an arrow with the part of the V at the base slightly filled in and rounded. The leaf stem joins the leaf towards its center. The dasheen leaves are dark green with a purple tinge along the leaf stem. There is usually a purple spot on the upper part of the leaf where the stem joins. The green leaf is lusterless (figs 72 and 73).

- (b) *Oto*. The *Oto* is a Latin American name for a variety of Taro. The *Oto* is a potato substitute and also contains poisonous, stinging oxalate crystals of lime which are rendered harmless by cooking. This edible tuber also must be cooked.

The tubers of the *Oto* are much smaller than the dasheen and grow off the side of the main root whereas the dasheen tuber grows straight down. The leaf is shaped like an arrow and is very similar to the elephant ear. The leaf stem joins the leaf at the apex of the V. However, the leaf is on the same plane as the ground. The leaf and leaf stem are dark green and lusterless. The edges of the leaf also have the purple coloration (figs 74 and 75).

- (4) *Yams*. The Yams and Yampi (*Discorea alta*, *bulbifera*, *esculenta*) are excellent potato substitutes. The yam grows on a twisting vine and is common in the culti-

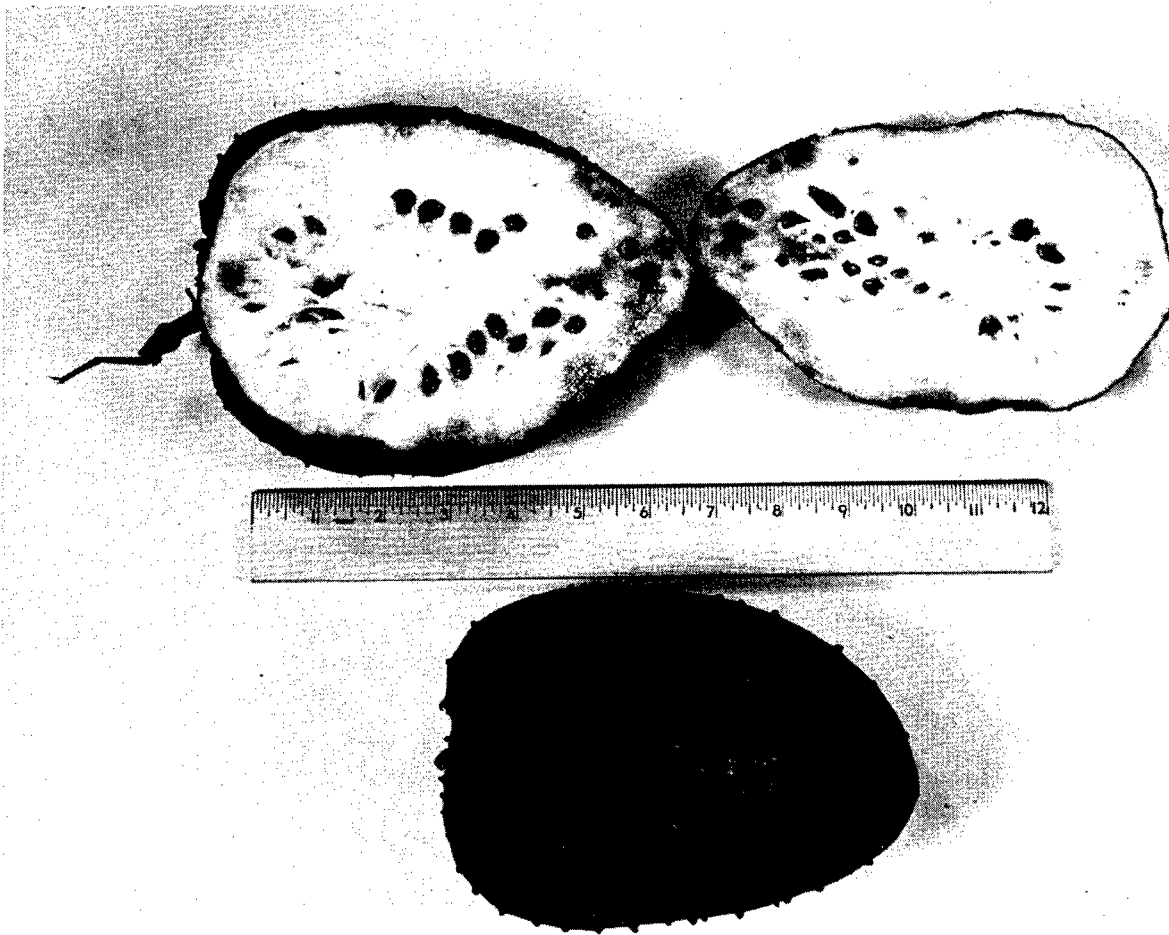


Figure 57. The sour sop.

vated and the wild state (fig 76). Most yams grow under the ground like sweet potatoes. Some will weigh up to 30 pounds. The color of the flesh will vary from white to purple. The vine leaves of yams can be distinguished by their heart or arrow shape. Some yams have leaves which are small and pointed with each leaf having 3 or 5 points. The vines of the yam resemble creeping vines and normally dry up when the yams are ready to be taken from the ground. Some yams are poisonous in their raw state and since the soldier cannot normally distinguish between the safe and the poisonous, all yams should be thoroughly prepared. To prepare yams that are not definitely known as safe, use the following procedures:

- (a) Cut the yam in thin slices.
 - (b) Coat with ashes.
 - (c) Soak in a stream or salt water for 3 to 4 days.
 - (d) Dry in the sun.
 - (e) Cook them changing the water a few times.
 - (f) Eat a little of the yam and wait for about 3 hours. If you have no ill effects, eat the remainder of the tuber.
- (5) *Yuca, Cassava or Tapioca (Manihot Escutento)*. These can be eaten only when cooked. The stalk-like leaves are deeply divided into numerous (3 to 7) long, pointed sections or fingers. The woody stem is slender and at points appears to be sectioned like a bamboo. Yuca grows to a height of 7 feet. The brown tubers are white inside. The yuca can be boiled, baked or roasted and eaten like potatoes. The



Figure 58. The malay apple.

white meat of the tuber can be grated, dried, and powdered into flour. This is the commercial source of tapioca. There are two distinct varieties, the sweet and the bitter. There is no sure way to tell the varieties apart without tasting them. Both varieties contain poisonous Hydrocyanic Acid, which breaks down and disappears when cooked. The bitter variety contains a larger quantity of the acid giving it a bitter, burning taste. The sweet variety, if eaten raw, may not have any effect on the digestive system; however, it should be eaten only after cooking as the poisonous (bitter) variety cannot be distinguished by observation or smell (fig 77).

g. *Vegetables and Vegetable Substitutes.*

- (1) *Akee (Blighia Sapida)*. A tree of West African origin and cultivated throughout most of the tropics, the tree is small (approximately 20-30 feet high) and has double leaves and about 10 large, oblong leaflets. The fruit is three-celled, colored from a range of yellow to a reddish or reddish orange, and shaped somewhat like a bell pepper. The Akee fruit contains three large, black, shiny seeds that are located at the end of the white pulpy mass. The seeds and hull are poisonous and must NEVER be eaten. The white meat, shaped like a half walnut or brain, is the only part that is edible. The white meat is

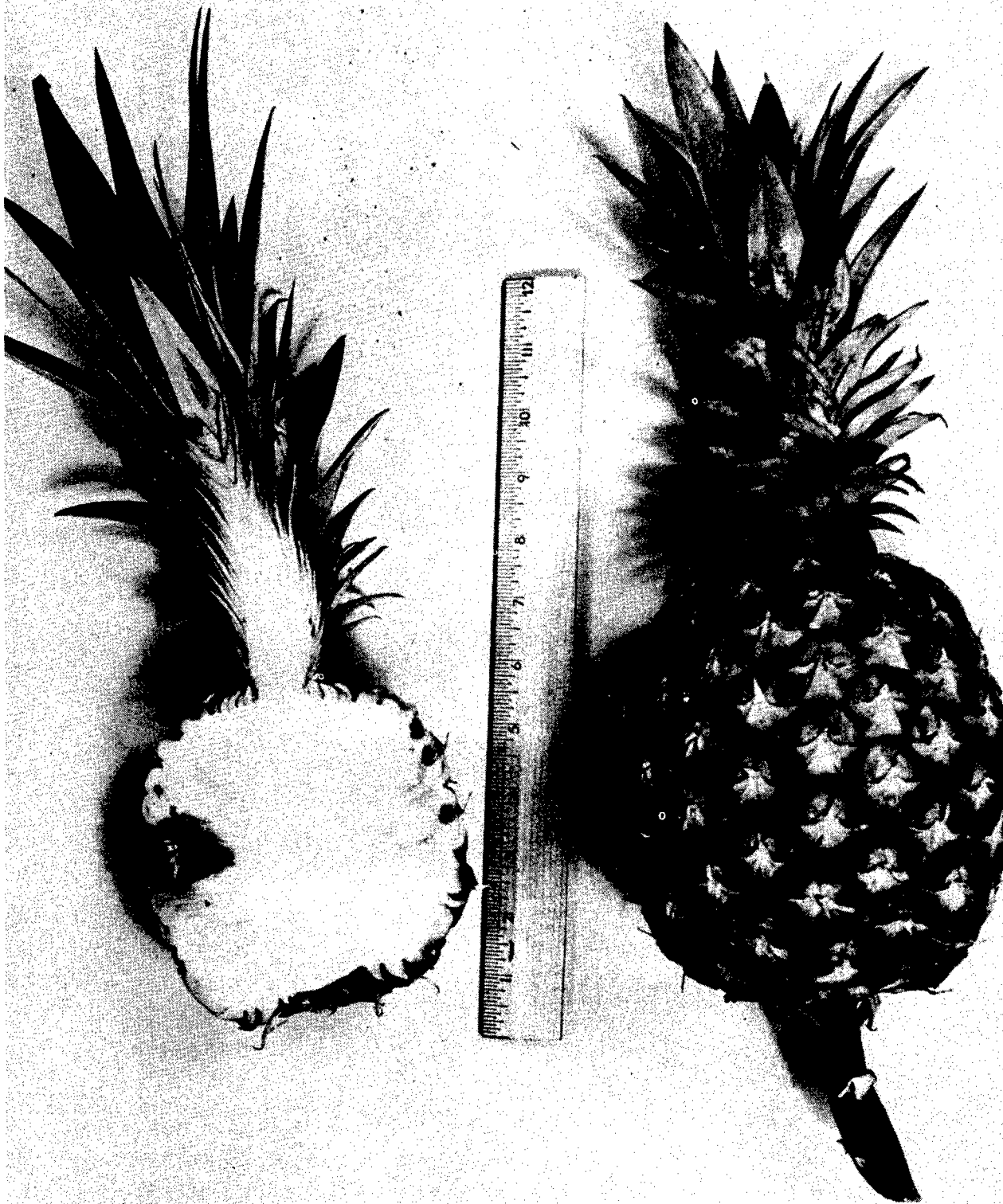


Figure 59. The wild pineapple.

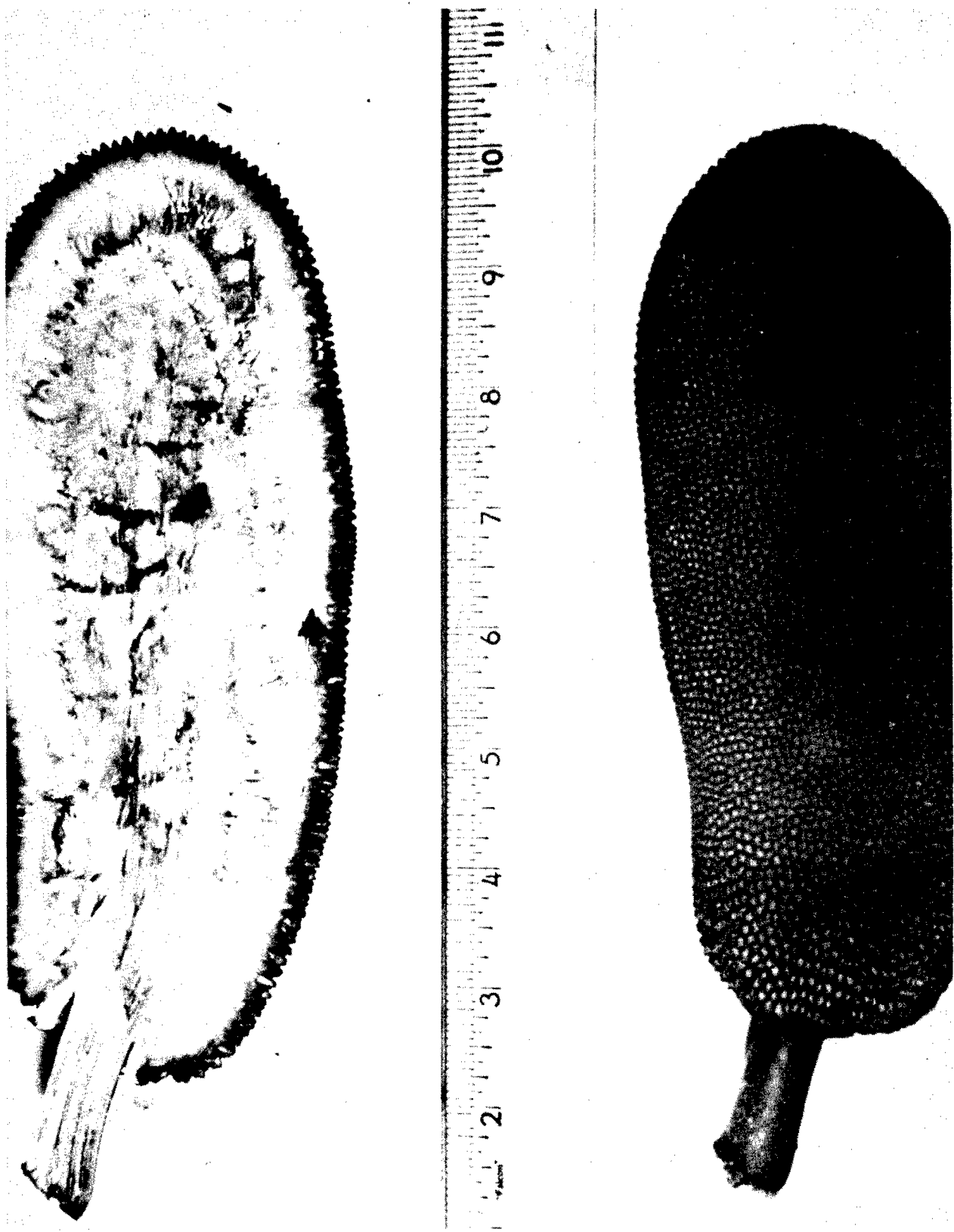


Figure 60. The jackfruit. This native of India reaches a length of over 2 feet and may weigh as much as 60 pounds at maturity.



Figure 61. Sugar cane. This tropical member of the grass family may be found in cultivated areas or in secondary growth. It may also be found growing wild in some swampy areas.



Figure 62. Hog plum. This very small fruit has a sweet taste and smell.

usually boiled in salt water and fried; however, it can be eaten raw. When ripe, the fruit opens naturally, exposing the black seeds and a portion of the white meat. The fruit must be gathered at the right time, because if it is unopened or overripe (opened too long) it is DEFINITELY POISONOUS. If other foods are available, the Akee should be avoided (figs 78 and 79).

- (2) *Avocado (Persea Americana)*. The fruit is also called the alligator pear. It is native to tropical America but is widely grown in other tropical areas. The avocado tree grows to a height of about 60 feet. It has dark green, leathery leaves which are approximately 6 inches long. The peeling is green in color during all stages of development. The meat varies from a yellow to yellow green when ripe. It has an excellent

flavor and is extremely tasty in salads. The large nut or seed can be eaten; however, it is of poor flavor. The avocado has been nicknamed "Soldiers Butter" because it is soft when ripe and has been used as a spread for use on bread (fig 80).

- (3) *Heart of Palm*. Every palm tree, regardless of size, has a "heart". The heart is merely the "unborn leaves" (underdeveloped leaves) of the tree. It is found at the top of the tree, just under the base of the fronds, in the top center portion of the trunk. The heart may be used as a lettuce or cabbage substitute and makes an excellent salad. It is also called "Swamp Cabbage" (fig 70).
- (4) *Bamboo*. Bamboo shoots may be cooked and eaten. They are wrapped in protective sheaths which are tough and coated with tawny or red hairs. If eaten, these hairs

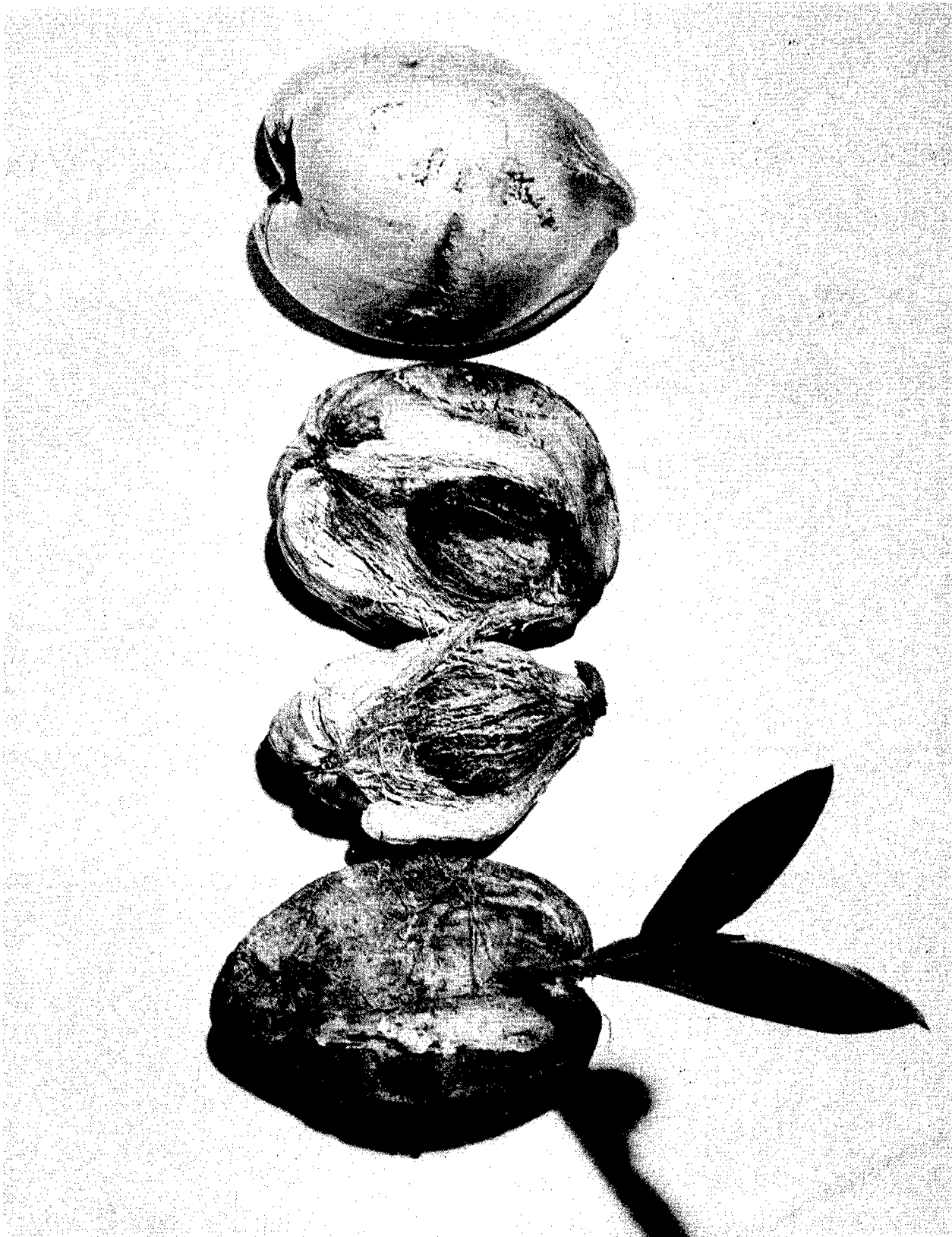


Figure 63. The coconut is shown here in the three distinct stages of development. At the top is a green coconut, in the center is a ripe nut and at the bottom is a germinating or "sponge" coconut.

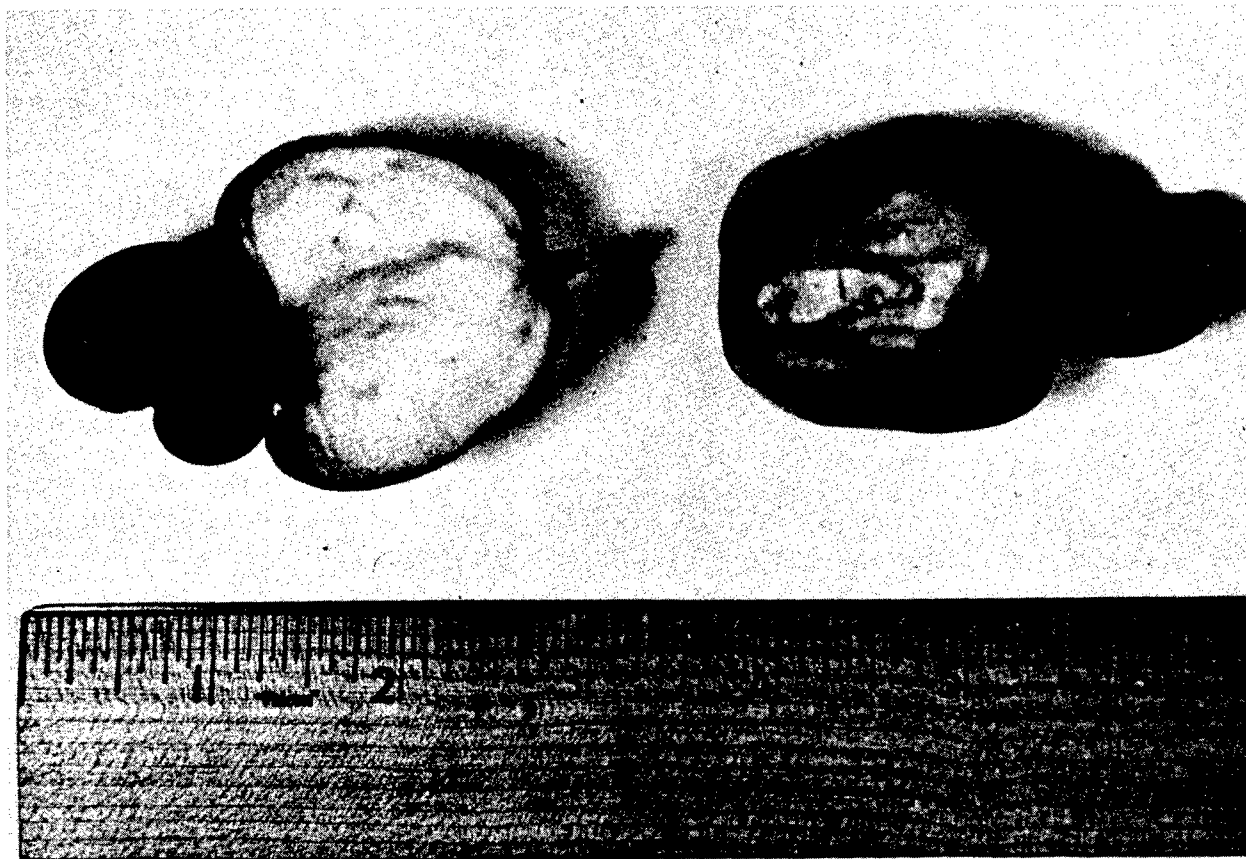


Figure 64. The cashew. The nut is the small, kidney-shaped appendage at the end of the fruit.

cause much irritation of the throat. Remove these outer sheaths carefully before eating the shoots. Bamboo deserves special mention because of its many uses to the soldier in the jungle. Two or three sections of bamboo can be fashioned into excellent canteens that will carry almost a gallon of water. By poking through the inner sections of the bamboo, a soldier can fashion an excellent waterproof map carrier. Bamboo sections split and packed with plastic explosive make excellent expedient explosive containers.

h. Poisonous Plants.

- (1) *Huevo de Gato (Thevita Nitida)*. One of the most common poisonous plants found in the American tropics, it has a scarlet colored fruit that looks like two fruits grown together. When cut, the fruit will dispense a white milky sap. The leaves of

the 12 to 15 foot shrub are leathery, light green and oval shaped and are about 8 to 10 inches long. The stem, when cut or broken, also emits the white milky sap. It is commonly found along the roadsides and in other secondary growth areas. It is dangerously called the "wild tomato" by some people.

- (2) *The Sand Box Tree (Hura Crepitans)*. This is a common jungle tree found in the American tropics as far north as Mexico. The tree is usually medium in size but it is not uncommon to find one that is over 100 feet high. The trunk is densely covered with short, sharp, rose-like thorns. The trunk is usually a gray-tan color while the light green leaves are usually clustered at the top of the tree and usually form a canopy. The fruit of the Sand Box is 2 to 4 inches wide and is shaped like a pump-



Figure 65. The Indian almond.

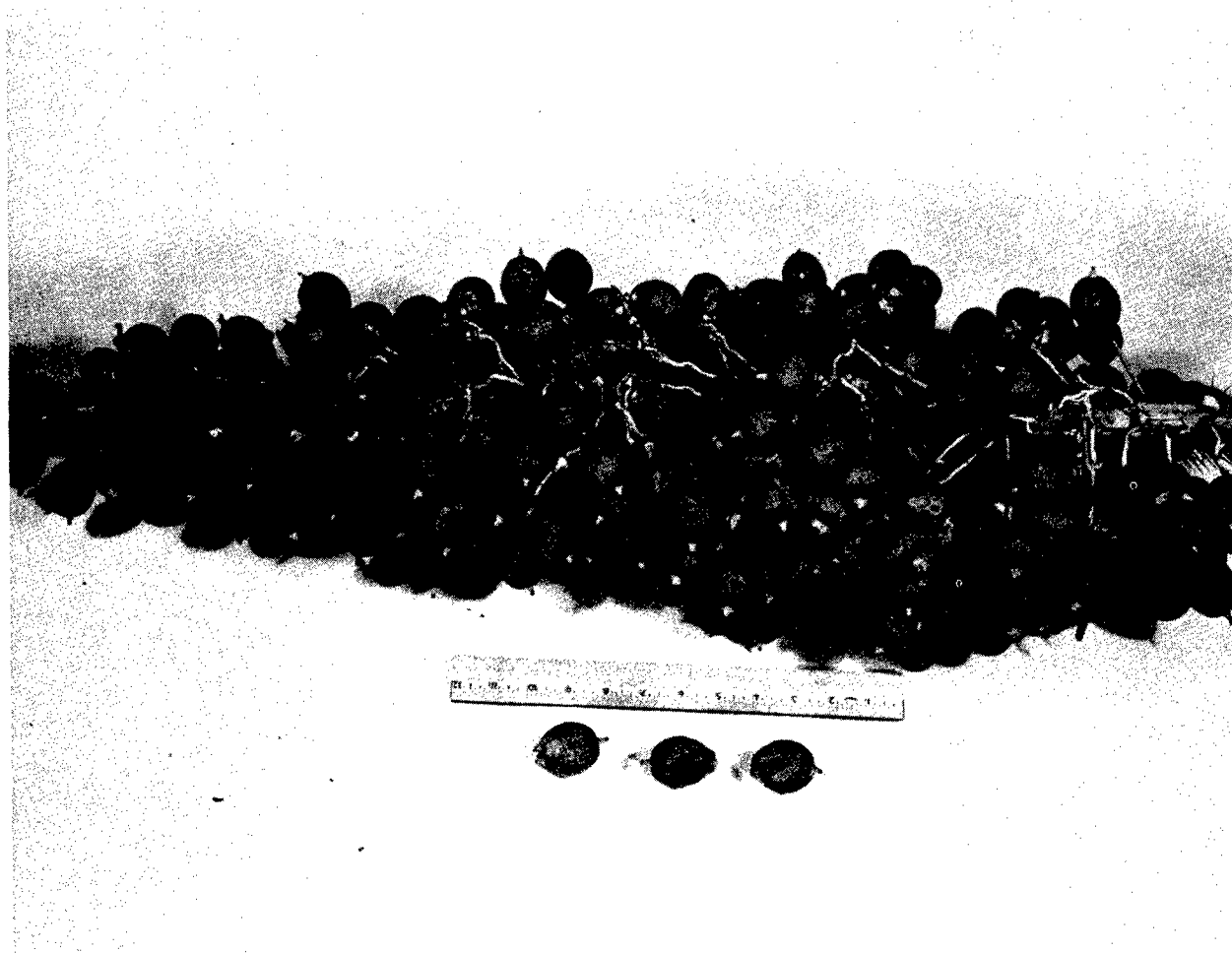


Figure 66. Black palm nuts.

kin, turning brownish in color when ripe. Inside the fruit there are about 15 one-seeded, woody cells that look like sections of an orange. When ripe, the fruit explodes violently with a loud report throwing the seeds a considerable distance. The seeds are poisonous and contain an oil which is violently purgative. Death is sometimes caused from eating these seeds. The milky sap of the tree is also poisonous and serious inflammation is caused when it comes in contact with the skin. If the sap comes into contact with the eyes, it can cause temporary or permanent blindness (fig 81).

- (3) *Elephant Ear (Alocasia Macrorrhiza)*. This poisonous plant has a heavy concentration of oxalate of lime crystals. It is used mainly for ornamental purposes but is discussed here because it is very similar to the

dasheen, oto or other varieties of taro. The leaves are shaped like an elephant's ear or an arrow. The leaves vary from a light green to a dark green in color and have a yellowish leaf stem. The leaf is very waxy in appearance. The leaf joins the leaf stem at the apex of the V. However, the axis of the leaf is on the same plane as the leaf stem. There is no edible tuber; however, since it is a member of the Arum family, as is the Oto and Dasheen, its young, tender leaves can be eaten in an emergency if boiled and the water changed often. The resulting product will resemble spinach (fig 82).

- (4) *Strychnos*. There are at least two distinct species, the *Strychnos Toxicaria* and the *Strychnos Panamanthis*. Both are poisonous with similar properties. The *Strychnos*

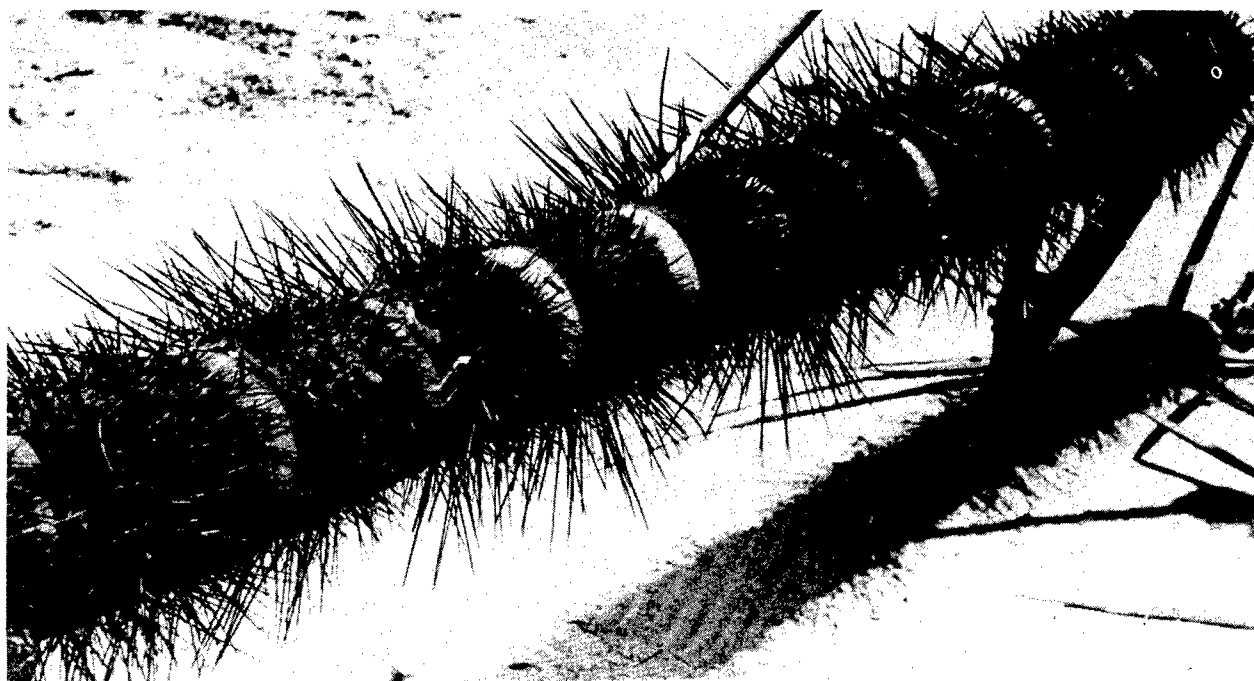


Figure 67. A section of the black palm tree. The spines, or needles, of this tree are very hard, extremely brittle and puncture the skin quite easily.

Toxifera is a slender, woody vine or shrub which has opposite growing leaves with green veins; one vein runs down the center of the leaf and two are located on each side of the center vein paralleling the outside edge of the leaf. The two outer veins are not prominent in a young leaf and, at times, are obscure in a matured leaf. The plant stem as well as the leaves are easily recognized by the numerous brown hairs that give it a wooly, soft appearance. The nickname "Cat's Paw" is derived from the shape of the soft, wooly leaves. The fruit is shaped like a ball and is usually two inches or so in diameter and has a hard, green or yellow skin. The fruit has several large seeds. This plant is famous as one of the sources of *CURARE*, one of the deadliest poisons known. A small quantity in the blood stream will soon cause death as the motor nerves are paralyzed almost instantly. If curare were injected into any part of the body, death would occur in a matter of seconds. Curare is obtained from the bark and roots by mashing them in water and boiling until a small amount of brownish colored paste remains in the bot-

tom of the kettle. It has been used by the South American Indians (Jivaro) for poisoning their arrows and darts.

i. *Distinguishing Edible and Inedible Plants.* There is no absolute method that can be used to determine whether an unidentified plant or fruit is edible or poisonous. However, an expedient method, which is not positive, will probably suffice in an extreme emergency. If the plant or food in question emits a white milky sap, it should be discarded. If the plant has no milky sap but emits an unpleasant odor, it is unsafe. If the fruit or plant passes these first two tests satisfactorily, it should then be tasted by placing the tongue on a very small portion of the substance. If the taste is agreeable, the plant should then be peeled and cooked. The water should be changed three or four times. A very small portion of the food should then be eaten and the consumer should wait three or four hours before a decision is made to eat the remainder.

j. *Preparation of Rice for Consumption.* In most tropical areas of the world the cereal grain rice is a staple food. This is especially true in the Orient. The individual soldier should know how to prepare this food properly either in small portions or in quantity. To prepare rice for one soldier utilizing a

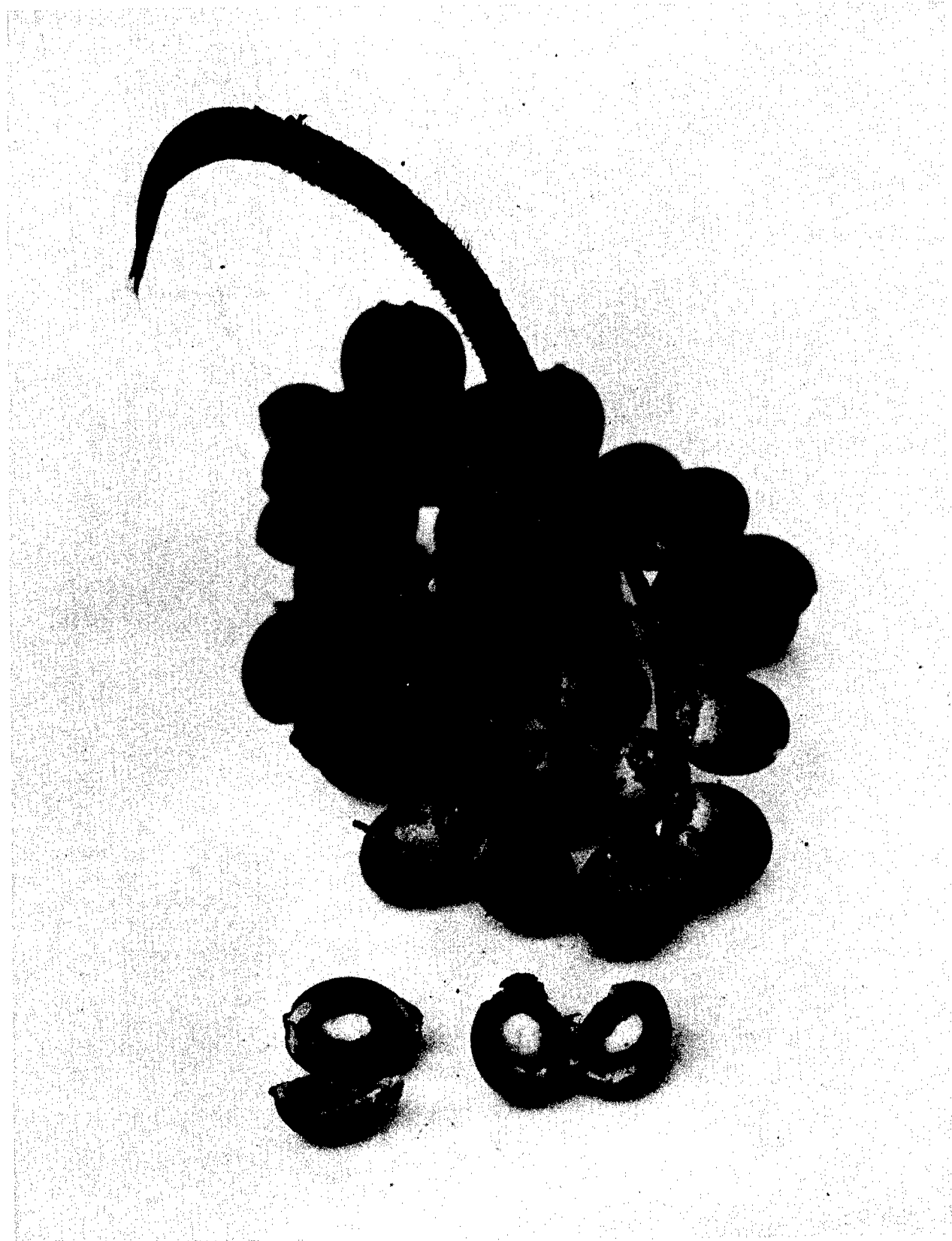


Figure 68. Canna brava nuts.

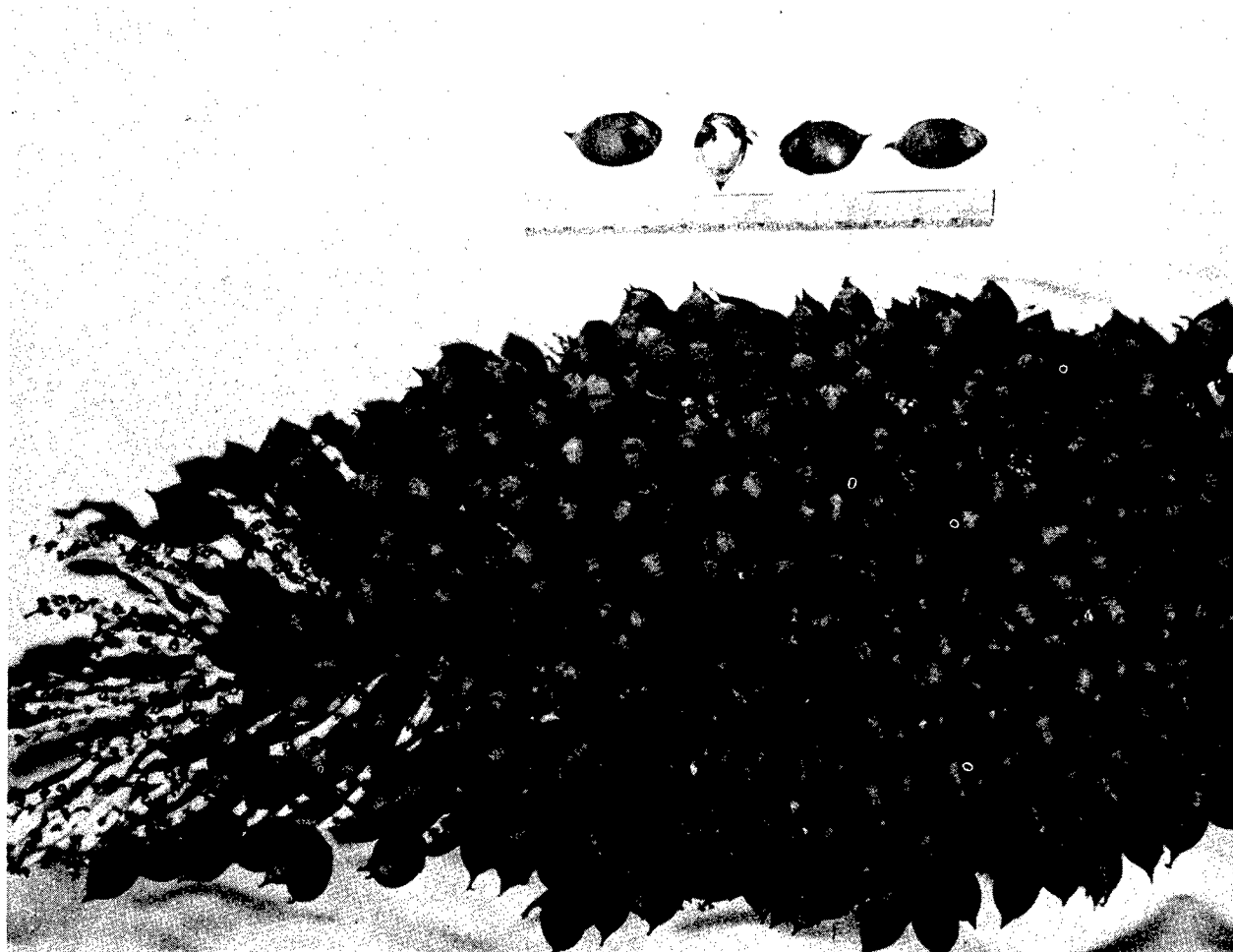


Figure 69. Corozo nuts. Note the large size of the cluster.

canteen cup as the cooking vessel, the following procedure is recommended:

- (1) Take one-quarter canteen cup of rice.
- (2) Add one-half cup water.
- (3) Add salt.
- (4) Place the cup on the fire until the rice begins to boil.
- (5) Cook until the water level meets the level of the rice.
- (6) Take it off the direct fire and place it near the heat where it will not scorch.
- (7) Steam the rice until done. When cooking larger quantities use the same cooking process, 1 part rice to 2 parts water by measure.

k. Other Wild Foods. In all tropical areas there is an abundance of food, in the form of animal life, fowl, snakes and fish. Any fur-bearing animal that

is apparently healthy, if freshly killed and properly prepared, can be eaten. Any bird or fowl that digests its food can be eaten. Boil all fowl for at least 20 minutes to kill all parasites. The buzzard ingests its food and its meat is not appealing or appetizing but it can also be eaten. Any snake that is healthy can be eaten. To be safe, cut off the head 4-6 inches from the tip. Water is abundant in the jungle, thus providing a source of fish of all types. Avoid all *ugly* looking fish with parrot-like mouths, puffed up bodies, spine covered bodies, or sunkey eyes. This applies especially to fish which are caught along coastlines, inside reef barriers, coral holes, lagoons, or sheltered coves.

30. Jungle Animals and Other Wildlife

a. General. The wet tropics abound in wild animal life. The tremendous varieties of animal species that are found in jungle areas throughout the world preclude discussions of each in this manual. How-



Figure 70. Heart of Palm. This is a very good vegetable substitute that can be eaten raw or cooked. Removal of the "heart" will kill the palm.

ever, a description of the more prominent species is necessary as the soldier should be able to recognize these inhabitants of the jungle environment. It is essential that troops realize that just as man has an inherent fear of some animals, the opposite is also true. With some exceptions, animals of the jungle will withdraw from any encounter with man. By becoming familiar with the wild inhabitants of the jungle, the soldier will better understand this type of environment. This will induce him to respect, not fear, the surroundings in which he must fight.

b. The Cat Family.

- (1) *Tigers (Panthera Tigris)*. Among the largest members of the cat family, tigers are found only in Asia where they occur as far north as Mongolia. The tiger is quite prevalent in the jungle areas of China, Burma, India, Malaya, Laos, and Viet

Nam. Tigers may reach a height of 40 inches and a weight of 500 pounds or more. These cats are distinguishable by their yellowish-orange coat with vertical, black, generally looped stripes, white underside and white patches over the eyes. Tigers habitually frequent forest and thick jungle, with which their color harmonizes. In the wet tropics they rest during the heat of the day and prowl after sunset, often travelling great distances in search of prey. Victims of the tiger consist mainly of deer, wild pigs, cattle, and goats. Tigers will eat carrion and, when hungry enough, frogs, tortoises, lizards, fish, and even insects. As a rule, tigers are wary of men, but there are many instances in which they have become "man eaters". This occurs when the stimu-

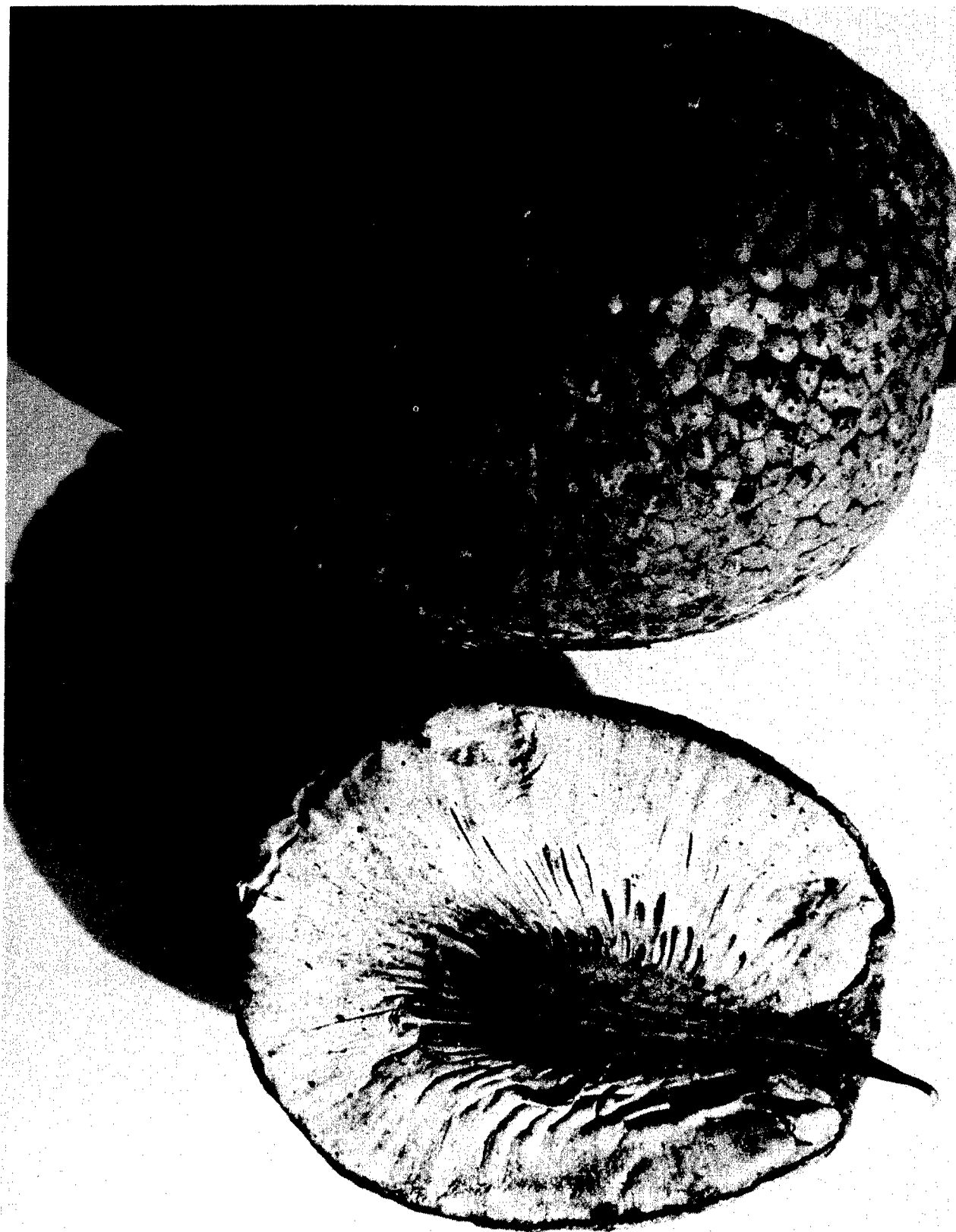


Figure 71. The breadfruit.

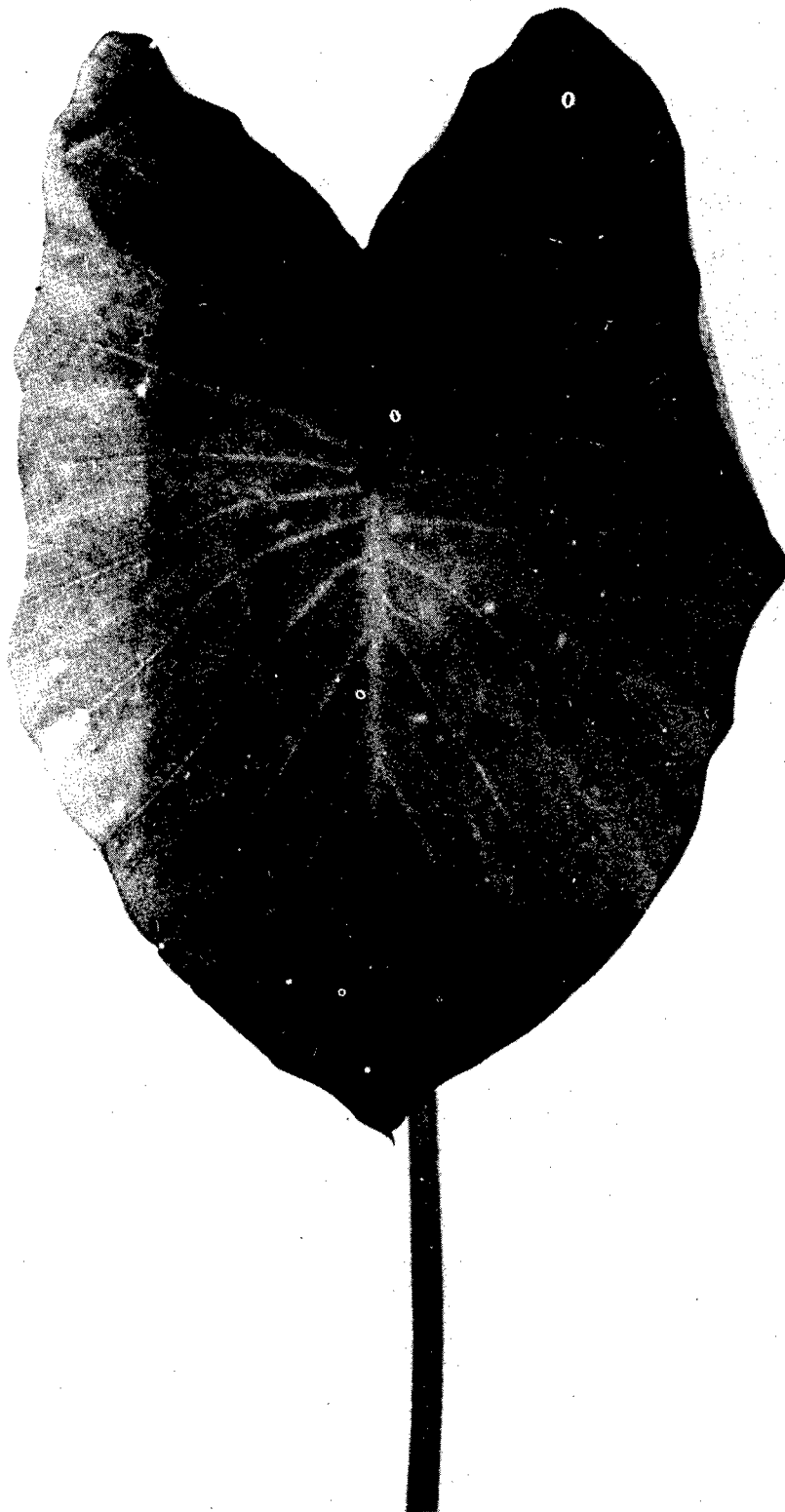


Figure 72. Leaf of a dasheen plant.



Figure 73. The dasheen tuber.

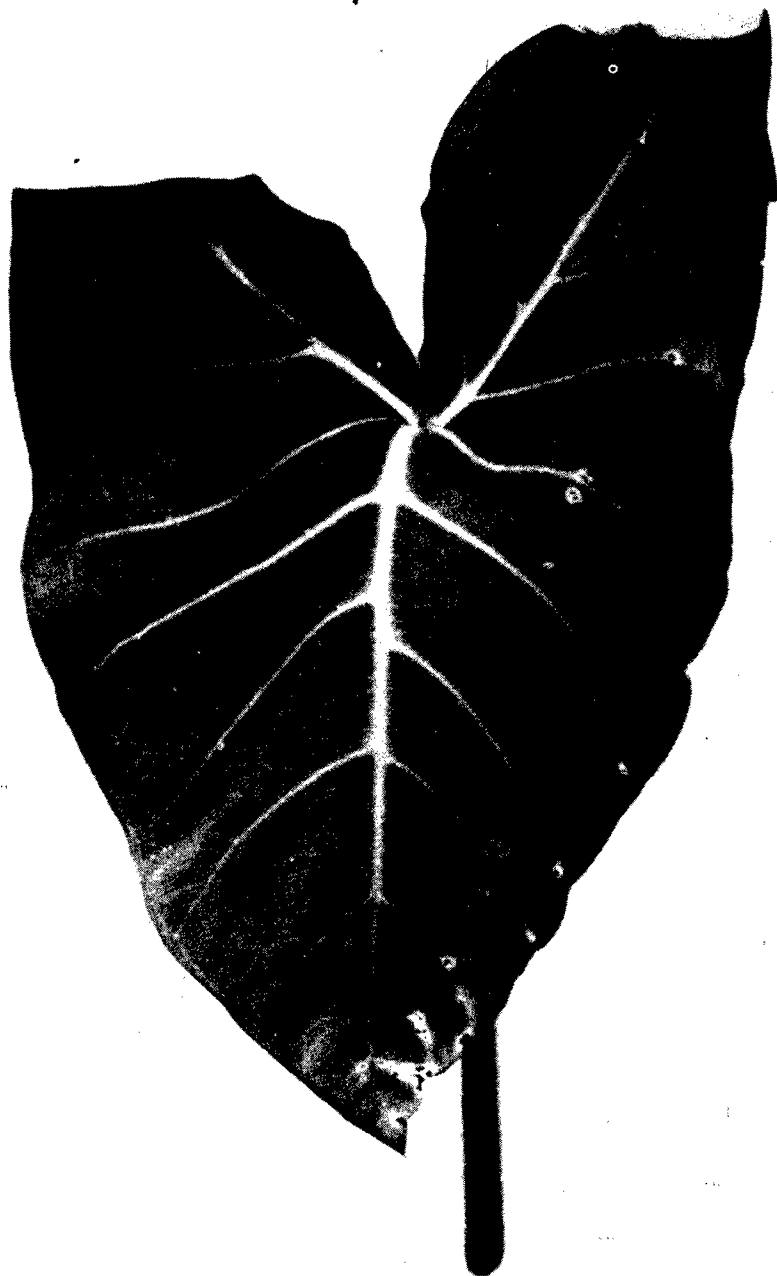


Figure 74. Oto leaf.

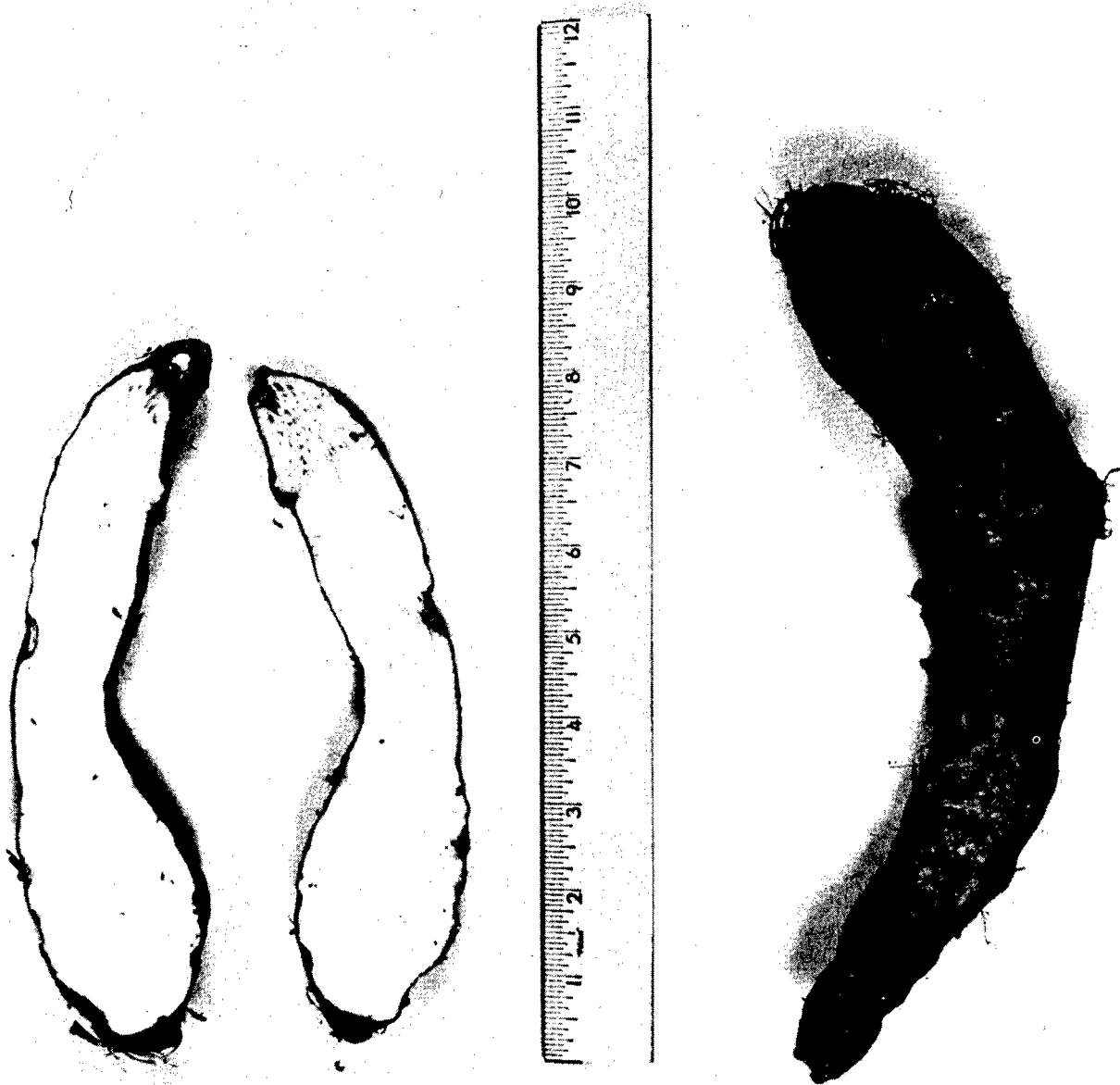


Figure 75. *Oto tuber*.

lus of hunger overcomes timidity, leading to the discovery that man is by nature defenseless and easily killed. When any tiger is surprised or alarmed it may attack man.

- (2) *Leopards or Panthers (Pantera Pardus)*. The leopard is distinguished by the spotted pattern of its coat. It has a longer tail than the tiger and is smaller in size. The coat is rosette patterned. Each rosette is composed of four or five solid spots forming a round or angular figure enclosing a

pale central area and sometimes containing one or more small black spots. Both coloring and patterns are subject to much variation. The leopard ranges over parts of both Africa and Asia. It thrives in the jungles of the Indies and Ceylon. It penetrates the heavy forests of Africa which the lion will not enter. At one time it was supposed that the Panther and the Leopard were two distinct species. It is now accepted that there is but one species represented by a number of local races differing in color and

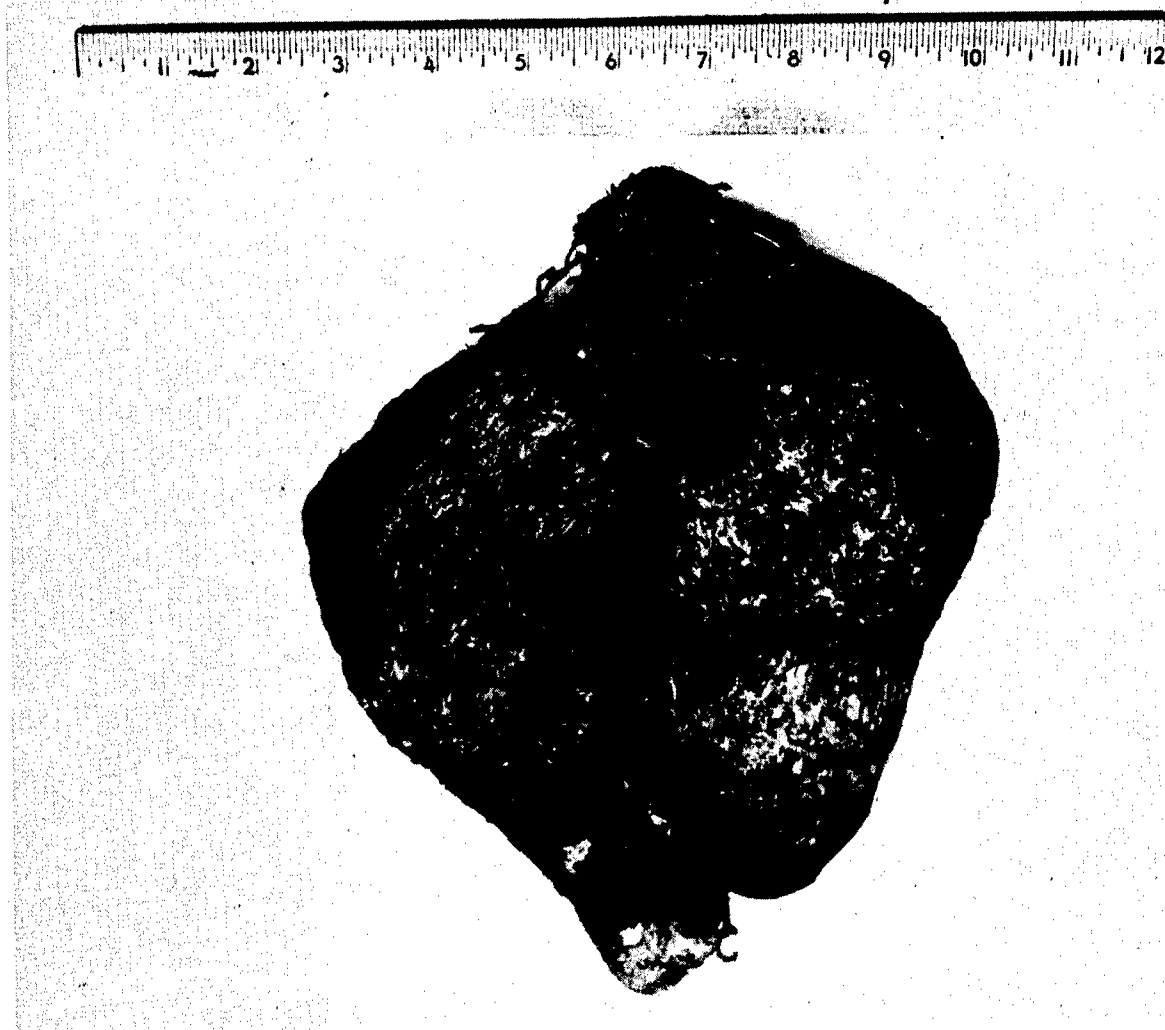


Figure 76. One type of yam.

size in accordance with varied environments. The dominant type is the yellowish leopard of the jungles of India and the East African fringe. The Javan leopard is smaller and more rusty in hue. The black leopard replaces the spotted in Southern Malaya. The voice of the leopard is distinctive; it is like a deep, rapidly repeated, barking cough, comparable to the sound made by a coarse saw passing through hard wood. The leopard is a tree climber and frequently lies in ambush along branches overhanging a forest. They are seldom dangerous to man unless wounded, alarmed, or cornered. The leopard grows as large as 2 to 3 feet high at the

- shoulders and a total length of about 7 feet, of which the tail is less than 3 feet.
- (3) *Jaguar (Panthera Onca)*. The largest, most powerful member of the cat family and the sole representative of the leopard group, the jaguar is found in the American tropics. Generally, it can be said that the jaguar has a golden yellow coat spotted with black rosettes. This cat closely resembles the leopard in color and pattern of the coat and voice and habits, but may be distinguished by its larger head, shorter tail, and more robust build. As a rule, the rosettes are large, and fewer, than the leopard. The male attains a length of 6 to 9 feet, with a tail about 20 inches long, and weighs up to 250 pounds. Its legs are

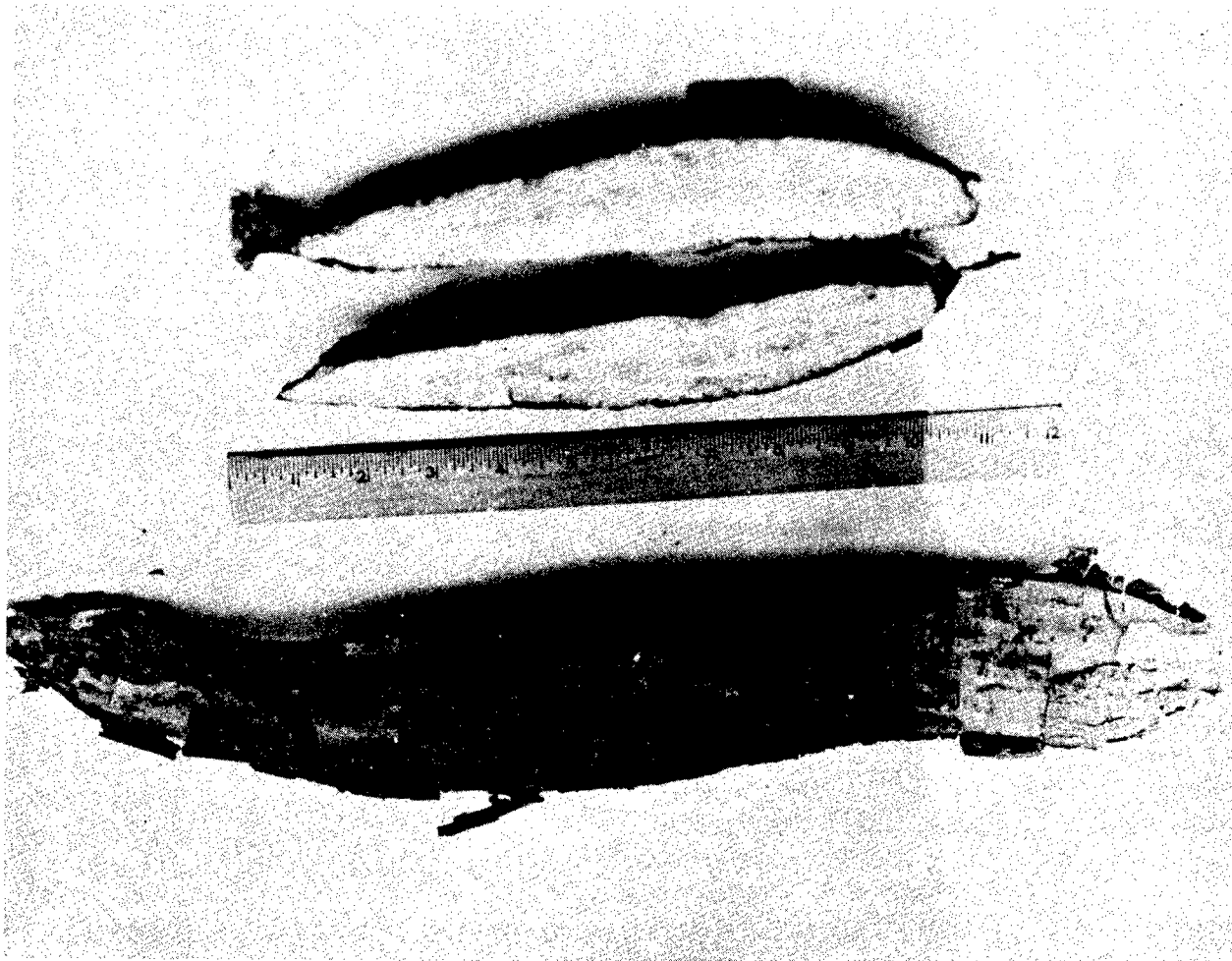


Figure 77. *Yuca tubers*.

short and muscular. The jaguar is an agile climber. It hunts monkeys and birds and is at home in the water, being an excellent swimmer and fisherman. It is primarily a dweller of forests and jungles and feeds upon deer, peccaries, and other small animals, in addition to monkeys, birds, and fish.

- (4) *Puma* or *Cougar* (*Puma Concolor*). This animal ranges throughout the Americas. The coat of the puma is a cinnamon color tinged with gold. While it feeds primarily on small game, it often kills calves and is especially fond of young horses, killing many annually. It is believed to be more friendly toward man than any other cat because of its practice of playing around camps at night without offering to harm

the occupants. The puma, however, should not be trusted when encountered in dense forest.

- (5) *Ocelot* (*Leopardus Pardalis*). The ocelot abounds in the jungles of Central and South America. It is a small, lean savage cat whose coloring closely resembles that of the jaguar. While resembling a jaguar, its markings are more beautiful and intricate. Most of the ground tint of the fur is smoky-pearl in color with black "rosettes" or egg-shaped ocelli, ranging from dots on the legs to large markings on the body. The ocelot will attain a weight of approximately 40 pounds and a length of 3 feet when fully grown. It can be easily tamed when young but becomes increasingly unmanageable with growth. Typical ocelots are shown in figure 83.

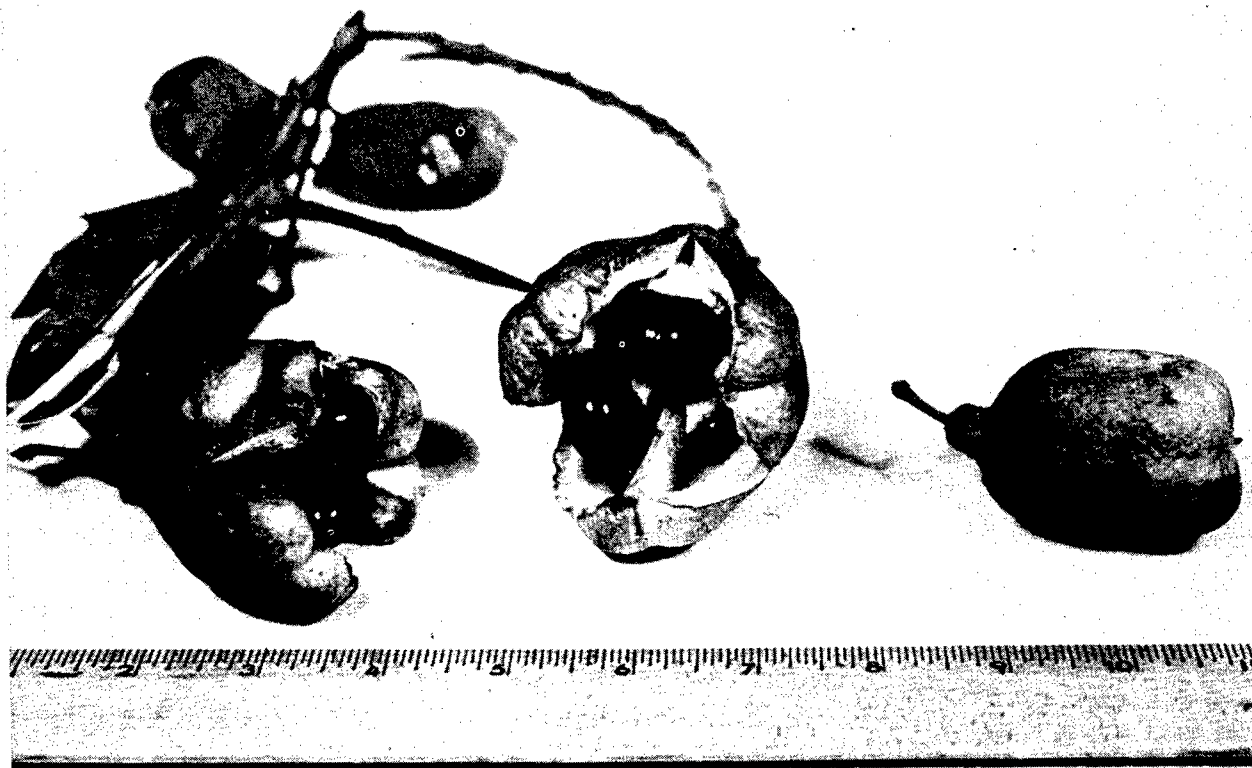


Figure 78. Akee. This photograph shows two Akee fruit which have opened. This is the only stage of growth during which the Akee may be eaten.

(6) *Jaguarundi (Felis Yaguarundi)*. This cat is fairly common in the Central American jungles. It is extremely savage by nature and will not hesitate to attack a larger animal. It attains a size, when fully grown, of about 30 inches in length. The color of the jaguarundi ranges from a dark brown to a light, rusty red. The jaguarundi, like most cats, is nocturnal and does most of its hunting at night.

(7) *Margay*. The margay is the smallest member of the cat family found in the Central and South American jungles. It is golden yellow in color, with small black spots and resembles the ocelot. When fully grown, it is about the size of a very large house cat.

c. *Deer*. Members of the deer family are found

in most jungle areas. They are not abundant due to the fact their only defense against the arch enemy, cats, is flight. In the Asian jungles several species of deer frequent the low, marshy areas adjacent to rivers. In the American jungle, two species of deer are most common. The "white tailed" deer of the jungle is found in thick upland forest. It is much smaller than the North American species and seldom attains a weight of more than 80 pounds. Another deer found in the American jungles is the "brocket" or jungle deer. This is a small, reddish brown deer which attains a height of about 23 inches. Extremely shy, it is found mostly in dense cover as it has no defense against other animals.

d. *Pigs*. All jungle areas have members of the pig family. In habit pigs are gregarious and are omnivorous in diet. They will eat any small animals they can kill, although they feed mainly on roots,

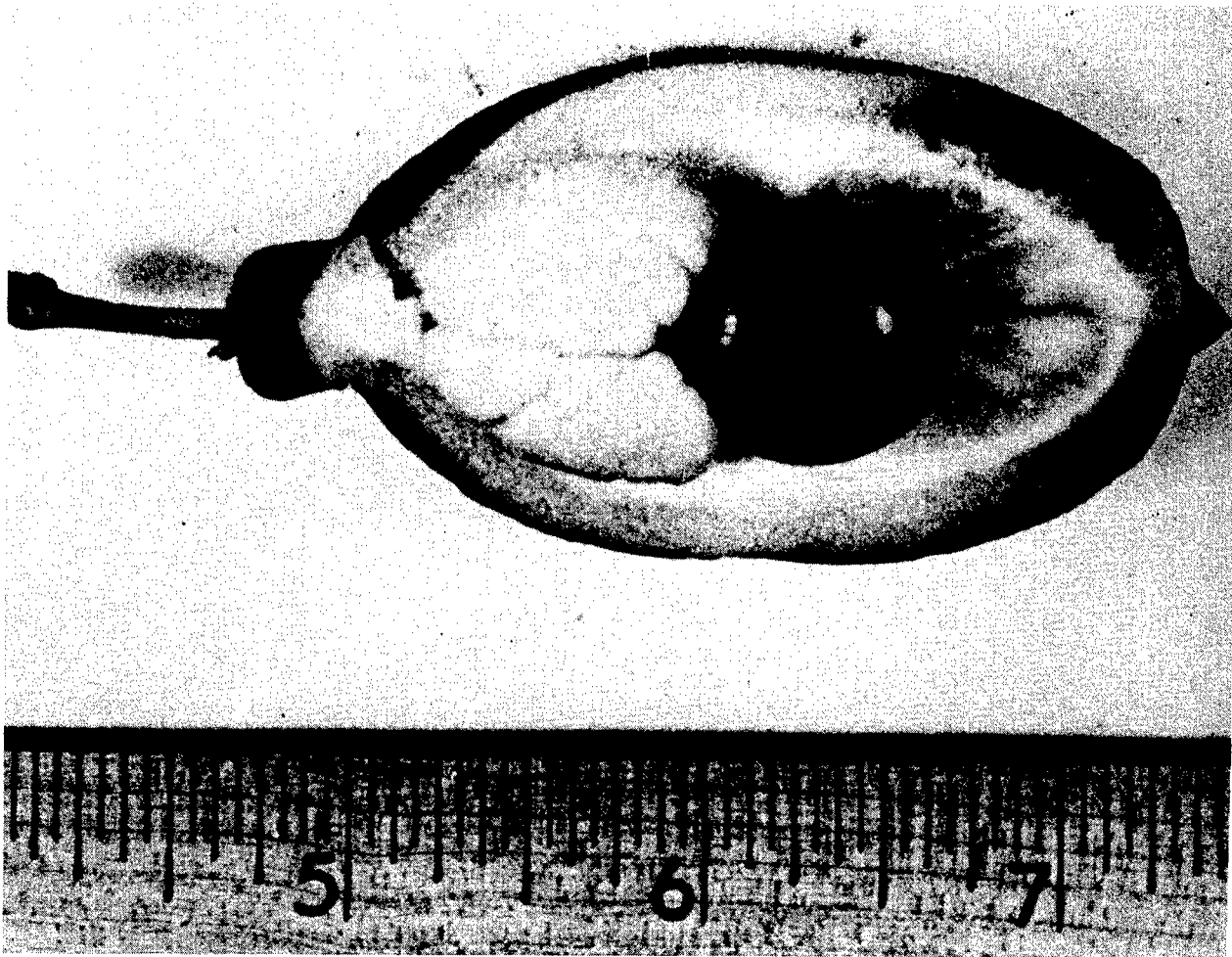


Figure 79. Another view of the Akee. The brain-like pulp is the ONLY part of this fruit that can be eaten. The rest of the fruit is POISONOUS.

tubers, and other vegetable substances. The most common species found in the Old World jungle are the Javan wild boar, the Indian wild boar, the Babirusa of the Celebes, and the Central African Forest Hog. In the American tropics, peccaries are common. These pigs are represented by two species, the "white lipped" peccary and the "collared" peccary. Both, being a basic grizzled black color, are distinguishable by the markings from which they derive their names. The white-lipped peccary, the larger of the two, is black in color with a white under-snout and has the reputation of being the more ferocious. It attains a height of approximately 18 inches. The collared peccary, reaching a height of 15 inches, is identified by the white or grey band around the body where the neck joins the shoulder. Peccaries travel in small or large packs with as many as 30 or more comprising a pack. While indi-

vidually they are not particularly dangerous, a pack can effectively repel any enemy and can make short work of a jaguar, cougar, or man. There are recorded instances of such happenings. Both type peccaries have musk glands which are located four inches up from the tail on the spine. This gland must be removed immediately when the animal is killed, otherwise the flesh will become tainted and unfit for consumption (fig 84).

e. *Raccoons and Kinkajous.*

- (1) *General.* The number of genera (different animals within a family) and species of raccoons are comparatively small. They are found only in America. In the Central and South American jungles, the most common are:

- (a) *Forest Raccoon.* This animal may be recognized by the black mark around its

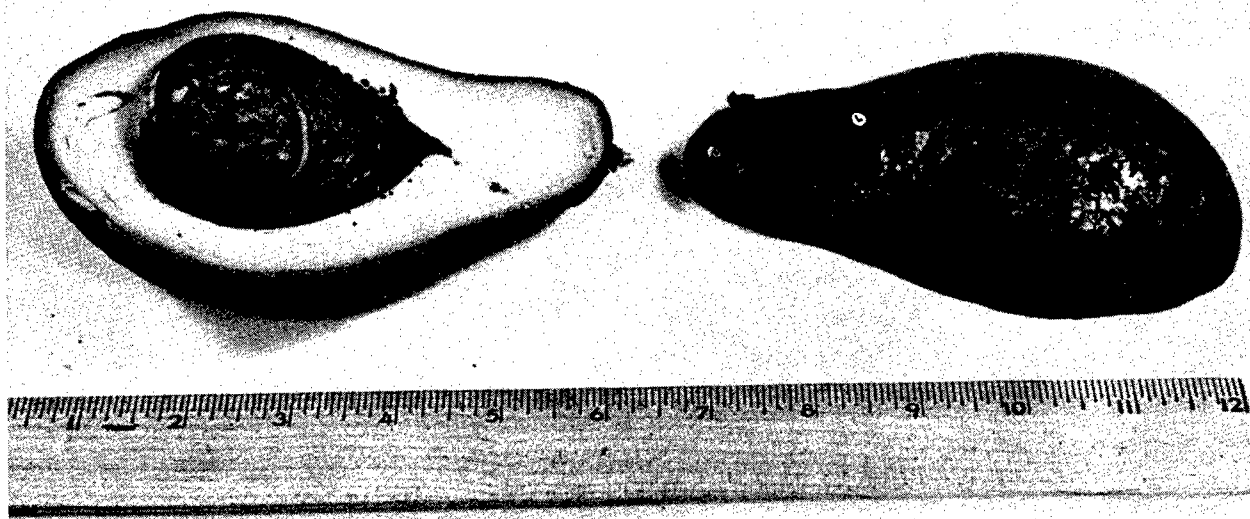


Figure 80. Avocado.

eyes and its ringed tail. Grey in color, this raccoon has long hair and five toes on all feet. It is noted for washing all its food prior to eating it even if the food is caught in the water. The forest raccoon weighs about 20 pounds, and eats small mammals, birds, eggs, corn and grain.

- (b) *Crab-eating Raccoon*. This animal is brown in color and is slightly larger and considerably stronger than the forest raccoon. Its principal sources of food are fish, crabs, frogs, and other amphibians. He is an excellent swimmer. Raccoons are formidable fighters and troops should be cautious when attempting to kill them for food.
- (c) *Coati-Mundi*. This member of the raccoon family is identified very easily. Its long, pig-like snout is usually carried close to the ground as the coati is one of the best scavengers in the jungle. Its long, hairy tail is usually carried high, vertically from the ground as the animal trots through the jungle. The coati-mundi varies in color from a dark to light brown and its kinship to the raccoon can be seen by the face mask which is a dark color. Coati-mundis may travel in packs up to 20 or more in number and

always have scouts when crossing danger areas. Usually the older ones lead with the younger ones bringing up the rear. Figure 85 shows the distinctive characteristics of the coati-mundi.

- (2) *Kinkajou*. This member of the raccoon family is a small animal about the size of the common house cat. It has a coat which is usually light brown in color. The prehensile (well adapted to grasping, like a hand) tail is quite prominent. The Kinkajou uses his paws quite well and has a very large tongue which is used to draw food into the mouth. Food consists primarily of honey, bees, and insects.

f. Rodents.

- (1) *General*. Jungle areas have large numbers of the various species of mice, rats, squirrels, and rabbits. Only the more unusual ones will be discussed here.
- (2) *Capybara*. The capybara is the largest rodent in the world. It is found only in the American jungles. The capybara is about the size of a small pig and may reach a length of 4 feet and weigh over 100 pounds. It has webbed feet, small ears, coarse brown hair, and no tail. It is an excellent swimmer and lives in or near water, eating vegetation both in and out of the water.



Figure 81. A sand box tree. Note the shape of the thorns on the bark. This tree is often cut into small pieces and pulverized by jungle natives. The pulp is then thrown in large pools of water or slowly flowing streams to stupefy fish. This allows easy collection of large numbers of fish and, curiously enough, does not taint the flesh. The sand box tree may exceed 3 feet in diameter at maturity.

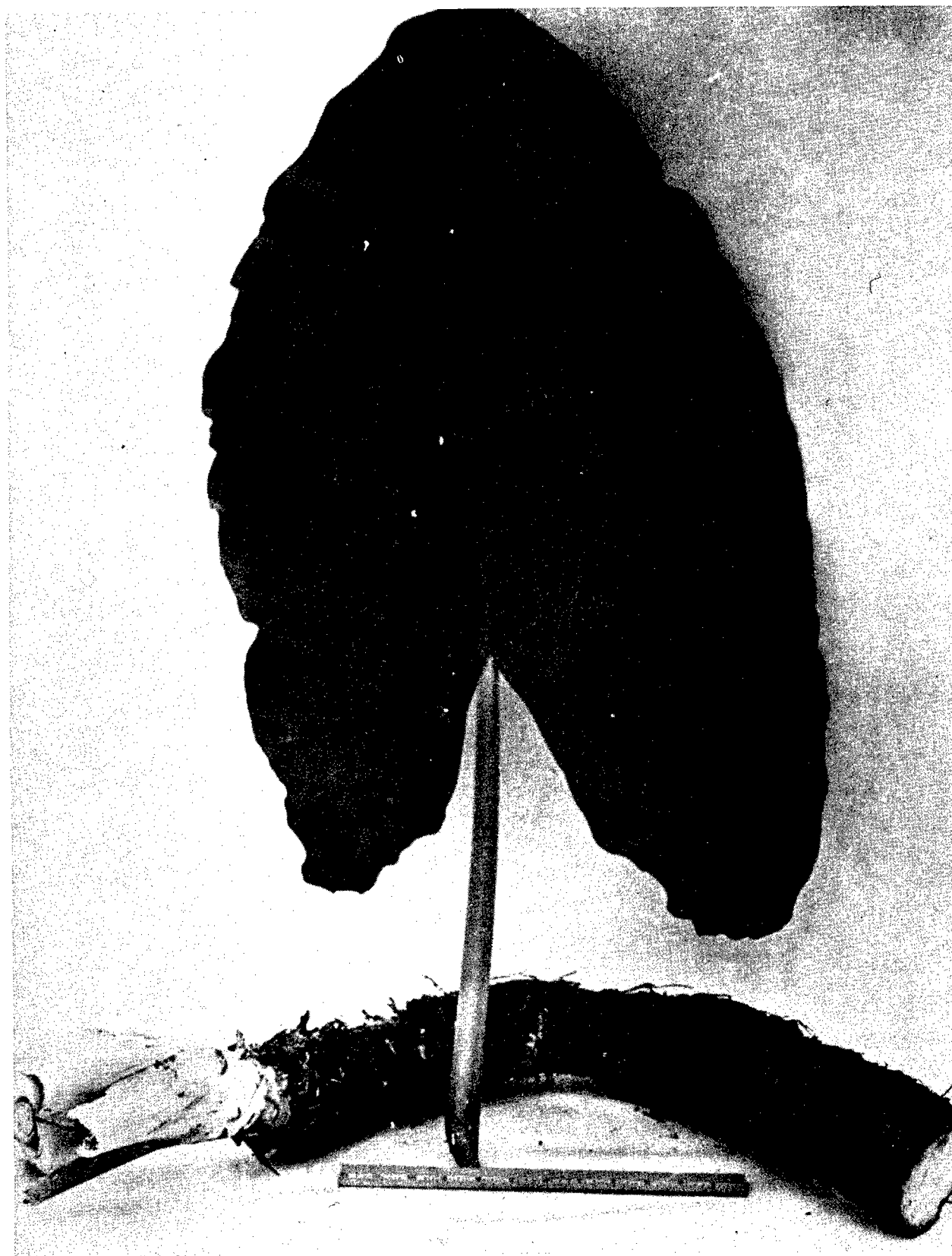


Figure 82. Leaf and tuber of the Elephant Ear. (The tuber is NOT edible.)

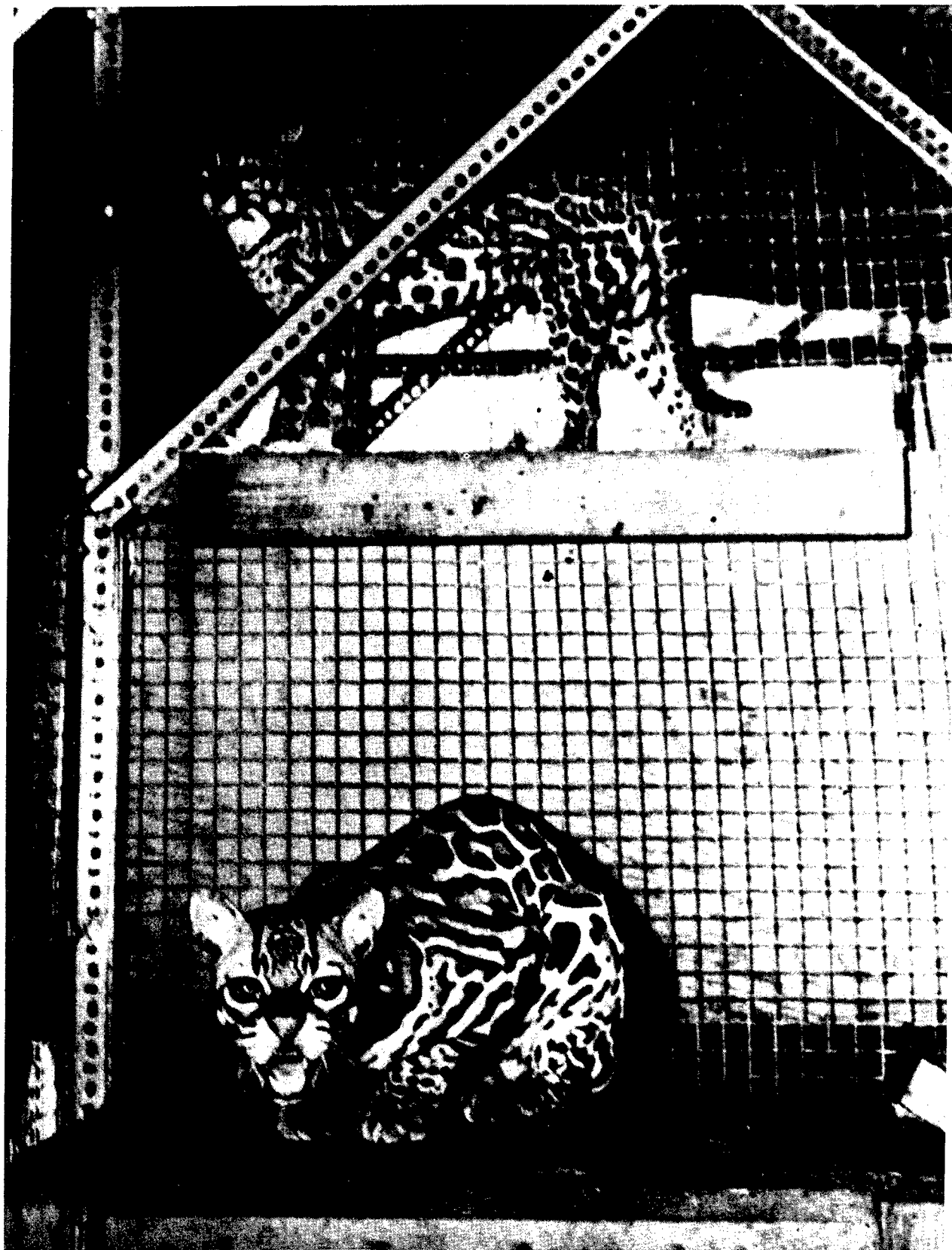


Figure 83. Ocelots.



Figure 84. Peccary.

- (3) *Paca*. The paca is a rodent similar in appearance to a large guinea pig, weighing about 20 pounds. The toes are hooflike and the tails are very short or entirely absent. The name "painted rabbit" has been applied to this animal by natives of the American tropics because of the white spots, or broken lines, down each side. It is mainly a forest animal, but it also lives on the plains. It feeds on grass, plants, and leaves of all kinds.

g. Canines. The dog family is not prevalent in wet tropics. Jackals are found in some areas of the Asian jungles and wild dogs live in the South American jungles and in the Indian jungles. By far the most common representatives of the dog family in jungle areas are the foxes. Care should be taken when preparing fox as food. Many have offensive musk glands that must be removed prior to eating.

The crab-eating fox of Central and South America is not a palatable meal because of its fishy diet.

h. The Primates. Tropical areas of the world abound in monkeys. There are tremendous numbers and varieties of sub-orders of the monkey family and it would not be possible or practical to attempt to discuss all of the species of monkey that are found in jungle areas. Monkeys offer a source of food to troops operating in the jungle. Monkeys are curious and can jeopardize operations by the noise they create and the attention they draw. In Old World jungles some of the man-like apes, such as the gorilla and the mandrill of the African jungles, are large and powerful enough to constitute a danger to man.

i. Anteaters. These are odd-looking and rather clumsy animals. Only the more common types will be discussed here.

- (1) *Great Anteater*. This animal grows to a length of about 4 feet although some re-



Figure 85. *Coati-mundi*. Shown in a most unusual pose as these animals usually carry their tails high at a very jaunty angle.

ports indicate it may reach a length of twice that. It is completely devoid of teeth, relying on an extremely long tongue to procure its food which consists mainly of ants, termites and their larvae. A sticky saliva traps the food and the tongue withdraws into the tiny mouth at the end of a long tubular muzzle.

- (2) *Lesser Anteater*. The lesser anteater is about one-half the size of the great anteater and weighs about 15 pounds. It is black, white, and tan in color with a prehensile tail which acts as a fifth limb, allowing the animal to climb and move about in the trees.

j. Tapir. The tapir is indigenous to the American tropics and the jungles of the Malay Peninsula, Sumatra and Borneo. It is a timid, inoffensive crea-

ture that browses on forest foliage and dashes away through the underbrush when alarmed or plunges into a river to escape an enemy. It is mostly nocturnal and solitary, two or three at most being found together. It grows to about 4 feet in height at the shoulders and weighs up to 600 pounds. Its coat is dark brown or black, the hair is thin and the skin is very thick. The tapir is pig-like in appearance, but has a proboscis or trunk about 12 inches long. The fore feet have four toes, the hind feet have three toes and all are encased in large, horse-like hoofs. The tail is a mere stump. The tapir is an excellent swimmer, sometimes diving into a river and walking on the bottom. It is a vegetarian and its cry is a shrill whine or whistle, like that of a bird or very small animal. Figure 86 shows one of these unusual animals. The East Indian or Malay Tapir is distinguished by its peculiar color and markings. The head, fore quarters and legs are black and the



Figure 86. Tapir.

loins are white. It is larger than the American tapir, standing over 4 feet high.

k. Sloth. Native to the American jungles, the sloth is completely arboreal (adapted to tree life). It will eat nothing but leaves and is practically defenseless. Nature has not been kind to the sloth as regards its appearance and its small and poorly developed brain. The head is round and the mouth and ears are small. The hair of the sloth is shaggy and arranged so that heavy rain downpours will drain readily. This creature spends almost all its life hanging upside down from the branches of trees. The sloth moves very slowly. It seldom falls as its slow movement allows a secure hold on one branch before moving to another. It sprawls when on the ground, however, and has great difficulty in moving. The sloths are equipped with long, curving claws on both fore and hind legs for climbing and hanging in the trees. The two-toed sloth, or unau, is brown or

black in color and has two claws on the fore legs and three on the hind legs. The three-toed sloth, or ai, is white or dirty grey in color and has three claws on all legs. The sloth eats leaves found in the trees it inhabits, gaining sufficient moisture from them to satisfy its water needs. The sloth's defense against enemies is to curl into a ball while hanging suspended from a limb. This presents a striking resemblance to the stump of a lichen covered bough. The sloth is an excellent swimmer (figs 87 and 88).

l. Amphibians. Jungle areas are infested with crocodiles and related amphibians. The crocodile is aggressive, vicious, and powerful. Troops should be cautious when approaching a river bank or swimming across a river in the jungle when crocodiles are near. The crocodile reaches a length of sixteen feet and has an olive green skin with black markings. The shape of the head is triangular and the snout is pointed. These features distinguish the crocodile



Figure 87. Three toed sloth.

from the cayman (alligator), which is native to Central and South American jungles. The cayman is similar in appearance to the crocodile, grows to about 12 feet in length, is dark brown in color and has a broad, wide snout (fig 89). The cayman is not as aggressive as the crocodile. Crocodiles must be considered man-eaters in Central and South American and Indian, Asian and African jungles. Although primarily fresh-water dwellers, they are found in salt water on the shores of jungles in India, Ceylon, Southern China, North Australia, and the Malay Archipelago.

m. Elephants. There are two kinds of elephants, the Asiatic or Indian and the African. Although there are differences between the two, this is an academic consideration and will not be discussed. Elephants are vegetable feeders and need plenty of food and water. They are normally found in the jungle, heavy forest, or bush and are never very far

from rivers, streams, or pools. Elephants are gregarious and travel in herds. Their eyesight is poor and their hearing is not good; however, their power of scent is unusually keen. They move exceedingly well in spite of their bulk and can climb steep inclines very fast. Elephants are dangerous when in musth, alarmed, wounded, or when calves are with them. Under these conditions they are apt to charge. Elephants will consume several hundred pounds of foliage, grass, cane, fruit, bark, tubers and the like each day. An elephant observed alone should be avoided, as chances are that such a solitary animal has been expelled from a herd and could be an extremely dangerous "rogue" elephant.

n. Wild Cattle and Buffaloes.

- (1) *Gaur.* The gaur is one of the largest and handsomest of the wild cattle. It is a huge animal with large curved horns, standing six feet at the shoulders and weighing as

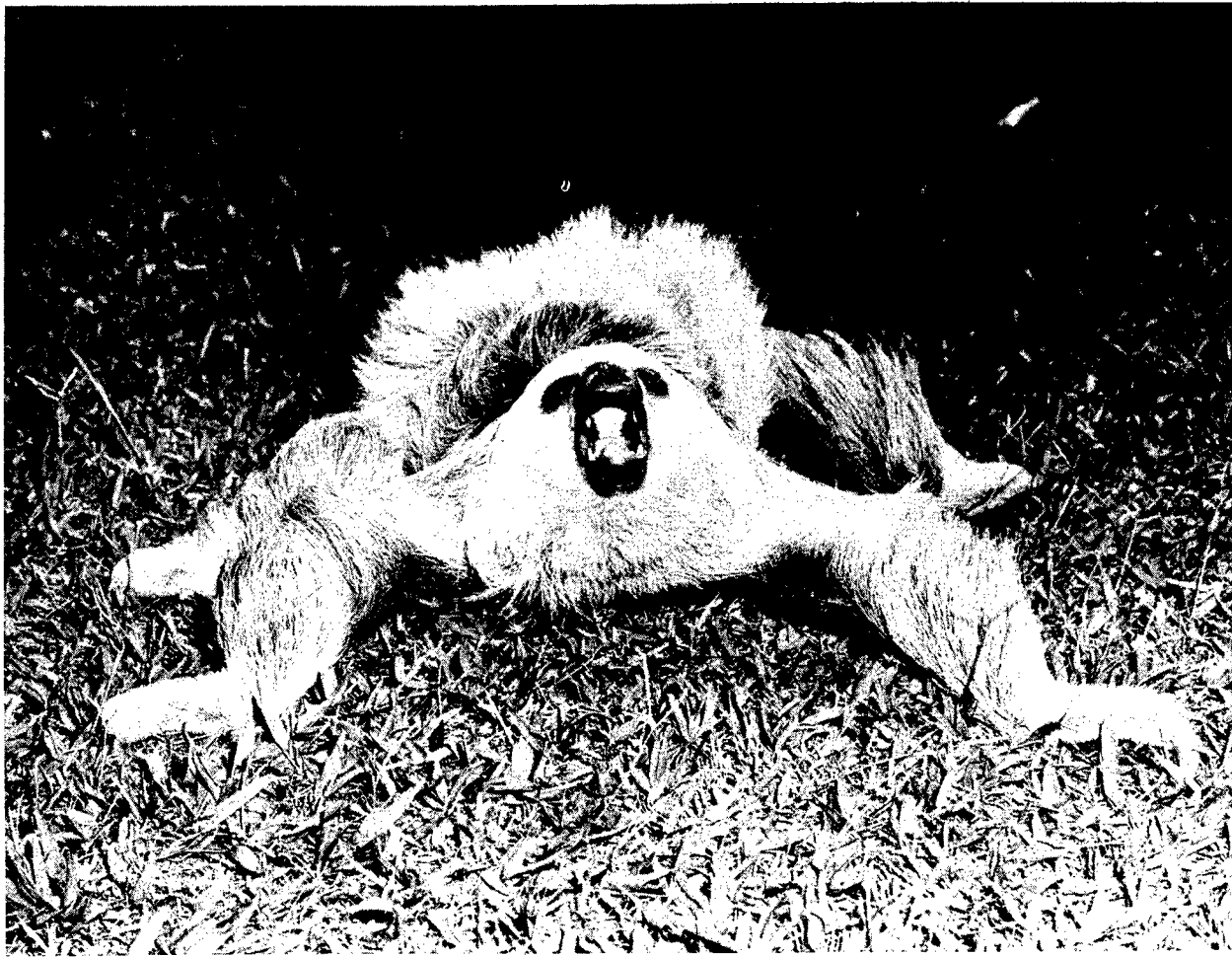


Figure 88. Two toed sloth. Although stupid and sluggish, sloths will fight if molested. The claws will inflict a painful wound and, because of the filth of these animals, immediate infection will set in.

much as a ton. Gaur are native to the jungles of India, Burma, the Malay Peninsula, Laos, Viet Nam and Cambodia, and are usually found in marshes and low, swampy places. When alarmed or wounded it is extremely dangerous.

- (2) *Buffaloes*. The animals of this family are often called "water buffaloes". Water buffaloes are native to the jungles of India, Burma, Malaya, Laos, Viet Nam, the Philippines and other islands dominated by jungle. Some water buffaloes are huge (example: the Indian buffalo is about 5½ feet at the shoulders and may grow to 9 feet in length) and many have little fear of man. They live in herds, usually in swampy areas and get the name "water buffalo" from their habit of mud-wallowing

and lying for hours immersed in water, with only the head above the surface. Water buffaloes have large horns and they are usually black in color.

o. Insects. The intense heat, high humidity, heavy rainfall, and incidence of low swamplands coupled with dense vegetation of the jungle constitute an ideal environment for insects. These pests exist in an astounding number and variety. Aside from the fact that some insects are carriers of serious diseases, they constitute a serious threat to health of troops by promoting infections. The natural tendency of a victim is to scratch an insect bite which, in the jungle, leads to infection. The soldier must be made to understand this threat to his health and must be made to apply medication to even the most trivial bite. Leeches are a serious problem in the Asiatic jungles. Troops should cover the maximum surface

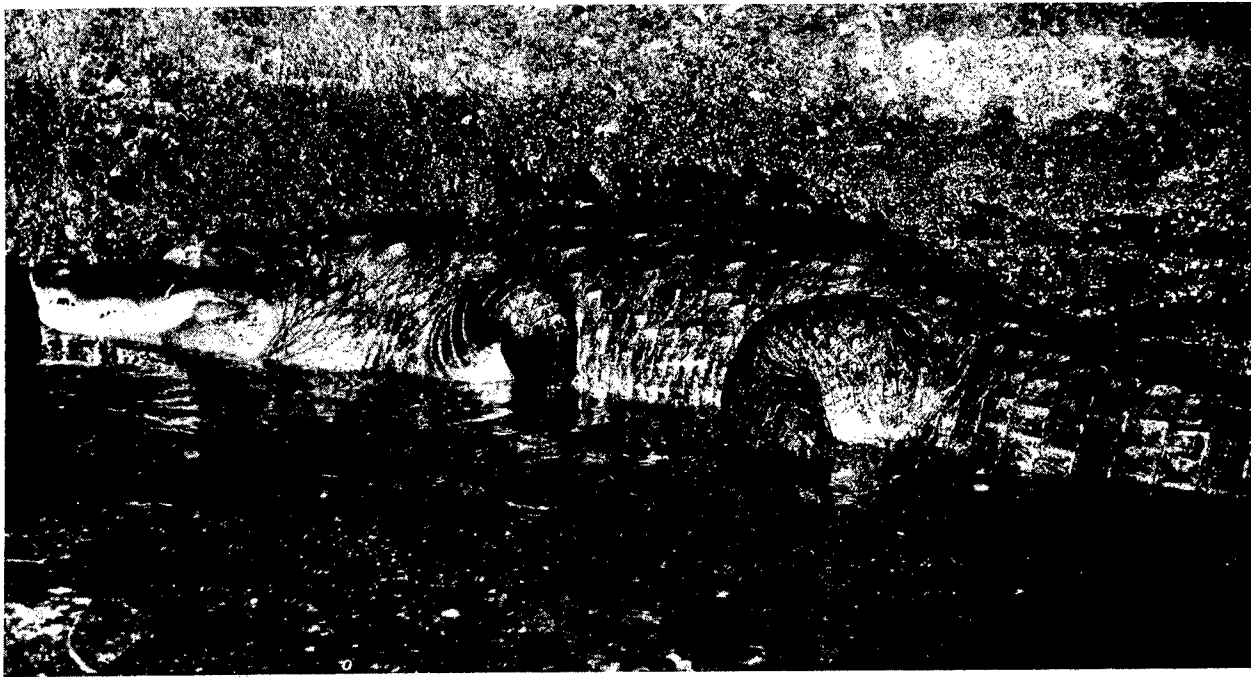


Figure 89. Cayman.

of body skin when moving in water-covered ground or when swimming rivers. At the first opportunity each individual should closely inspect his body for leeches as their presence is not usually felt until some time after they attach themselves to the body. They will cause profuse bleeding in some cases. The individual must not pull the leech out of his skin. Tobacco juice or a lighted cigarette should be applied to the leech; this will cause the parasite to back out of the skin. This is necessary as the head will be left in the skin if the leech is pulled out and serious infection and bleeding will result. This same procedure applies to the removal of ticks. In addition to leeches, ticks, lice, and mosquitoes, ants are another enemy of the jungle soldier. Some are merely irritating; some are so large that their bite can be incapacitating. Troops must be required to make maximum use of the mosquito bar and insect repellent. For a detailed discussion of diseases caused by insects, see FM 21-76, FM 21-10, FM 21-11, and paragraphs 138 through 147 of this manual.

p. Birds. Tropical birds exist in the greatest variety and abundance in the jungle. Although their brilliant plumage assists in easy detection, they are very difficult to obtain as food. They are very noisy and contribute heavily to the constant, weird noises heard in the jungle. When alarmed, birds may also betray the movement of a body of troops.

31. Snakes

a. General. The widespread terror of "the snake infested jungle" prevalent in the minds of most peoples is an imaginary mental image. It is true that the number and variety of snakes are high in the wet tropics; however, the incidence of poisonous snakes is no higher than in some of the swamp areas of the Temperate Zone. Although snakes are generally classified as poisonous or nonpoisonous, troops should be conditioned to consider all snakes to be poisonous until positively identified. Because of the threat of snake bite and the requirement for proper first aid in event of bite, the individual soldier should be able to identify common poisonous snakes of the tropics. The following descriptions consider snakes by geographical areas.

b. Snakes of the American Jungles.

- (1) *Bushmaster (Lachesis Muta).* This oval-headed, longest and heaviest viper of the American tropics averages between 7 and 12 feet in length. It is the only American viper which lays eggs (10 to 14 at a time), all the others producing living young. It is the second largest poisonous snake in the world, second only to the King Cobra. This snake has a saddle pattern of black and brown with triangular white patches, scaly skin, and a sharp ridge surmounting



Figure 90. Bushmaster. Note the pebbly texture of the skin and the prominent ridge down the back apron. These are sure marks of identification of this snake.

the back. The venom of this great pit viper is not as deadly as that of some other New World species, but great fang length and the large amount of poison injected by a single bite make it the most formidable of the New World poisonous reptiles. It is most frequently found in lowland forests on slight ground elevations—seldom in hollows. The poison of the bushmaster is both meotoxic, destruction of the red blood corpuscles, and neurotoxic, destruction of the nervous system. Figure 90 shows typical markings of the bushmaster skin.

- (2) *Fer-de-lance*. In Central and South America this snake is sometimes called “barba amarilla” or “Equis”, which translated means “yellow beard” or “X”. This is prompted by a yellow color found on the

throat and lower jaw area and by the X-like design of body markings. The length of this snake may reach 8 feet though some species are much smaller. Coloration is variable, from grey to olive green, brown, or even reddish, with dark, light-edged crossbands or triangles, the apex of which extends to the center of the back. The definition of the name signifies “head of a lance” and is appropriate as the snout is pointed, the temporal region swollen and the aspect of the head like a javelin point. A female fer-de-lance has 40 to 70 live young; all are fully-charged with poison at birth. The poison (venom) is hemotoxin, which destroys the red blood corpuscles. Figures 91 and 92 describe the markings of the fer-de-lance.

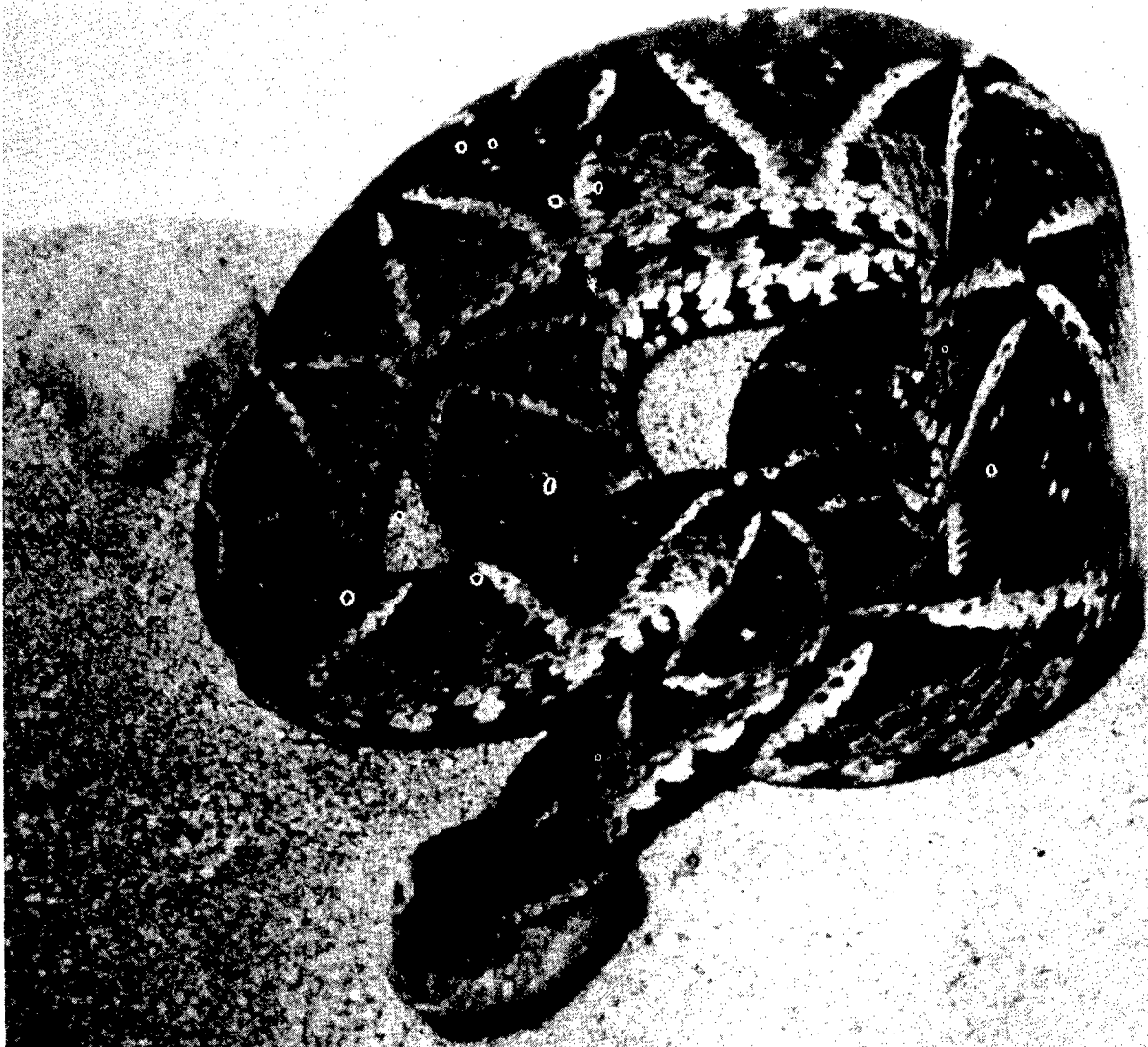


Figure 91. Fer-de-lance. This photograph shows the characteristically lance-like head which gives the snake its name.



Figure 92. Another view of the fer-de-lance. This picture shows the X-like markings on the sides and back of this snake.

(3) *Hog-nosed vipers*. Pacific coastal species (*Bothrops Lansbergii*) and Atlantic coastal species (*Bothrops Nasutus*) are true pit vipers, very poisonous and must not be confused with harmless namesakes found in the Temperate Zones. Both are dark brown or black with faint brick red rhomboid markings on their backs and from 12 to 18 inches long. The tipped-up nose of the Atlantic species is more prominent than that of its Pacific relative. Both species are predominately ground snakes and spend little of their time in the forests. They are less apt to strike than the fer-de-lance, and few bites from either species are known. The venom is composed of powerful hemotoxin, which destroys the red blood corpuscles.

(4) *The Eyelash Viper (Bothrops Schlegelii)*. The eyelash viper is the most common arboreal viper found in the American jungles and reaches a length of 22 inches. It is widely distributed and can be expected in any thickly-wooded area from near sea level to elevations of 3,000 or more feet. It is sometimes called the "palm viper" but this is somewhat misleading in that these snakes do not confine themselves to palm trees alone but may be found in any type of bush or low tree growth. The eyelash viper is markedly different from the other species by having 2 or 3 pointed, horn-like scales between the eyes and the appearance of having eyelashes. This pit viper may occur in two distinct color phases—one a mossy olive green with red and black



Figure 93. *Boa Constrictor*. This snake is in molt. Note the saddle markings from the head to the midsection and the X patterns on the skin toward the tail. The Boa is often confused with the Bushmaster during this molting stage as the skin becomes rough and scaly much like that of the poisonous snake.

and the other being a pale lemon color with black markings.

- (5) *Coral Snakes*. There are many species and subspecies of coral snakes which are well known. In Central and South America alone over 40 different species have been identified. They normally are found from sea level to altitudes of 4,000 feet. These snakes average 12 to 40 inches in length and are brightly colored with bands of red, white, yellow, and black normally encircling the body. All such colored snakes should be considered poisonous until proven otherwise. The head of the poisonous coral snake is little, if at all wider than the body, and a neck does not exist as it does in other snakes such as the pit vipers.

The tip of the snout and all of the upper surface of the head as far back as the eye are black. The eye is very small, being little more than pinhead in size. The paired poison fangs are small, permanently erect, grooved, needle-sharp teeth located near the front of the upper jaw. For the coral snake to eject its venom, it is necessary for it to chew.

- (6) *Sea Snake*. There are more than 50 different species of sea snakes. Superficially, they resemble an eel in having a long, flattened head and compressed paddle-like tail which is used in swimming. Their colors vary as well as the pattern marking. Most will have black and yellow markings, with half the snake being one color and

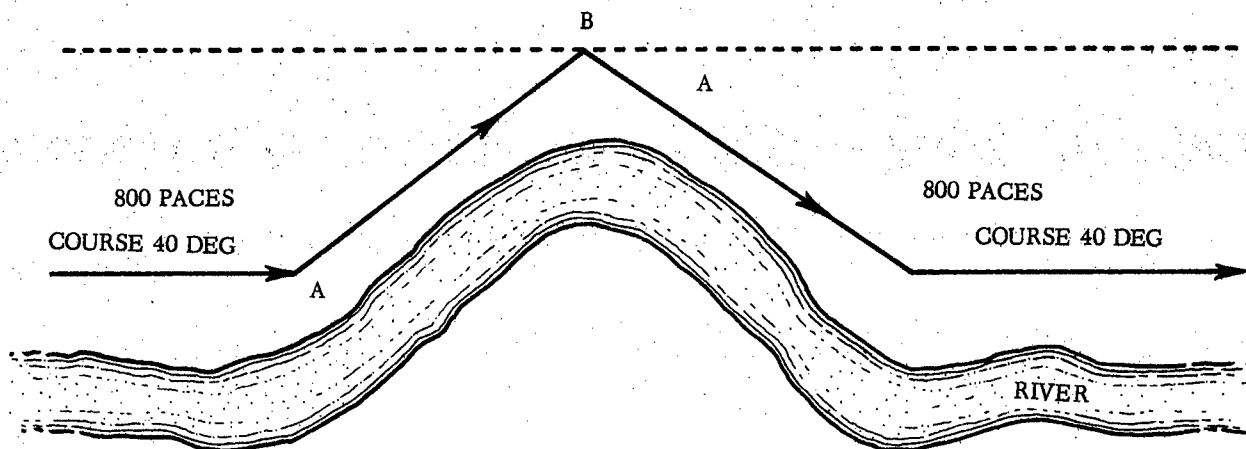


Figure 94. Another view of a boa constrictor. The smooth, shiny skin is a distinguishing characteristic of this snake.

the other half being another. On some snakes the pattern will be in broad stripes from head to tail and on others it will be in broad, faint circles around the body. Their length averages from 2 to 3 feet. The snake has the same type of short, erect, immovable front fangs as the coral and cobra. Curiously enough, the sea snakes are perhaps the most venomous of the poisonous snakes, but at the same time they enjoy the reputation of being the most harmless. This is because cases of sea snake bite are rare. A good way to distinguish between a sea snake and an eel is that sea snakes have scales whereas eels do not.

- (7) *Boa Constrictor*. The boa is not a poisonous snake; however, it is very similar in outward appearance to the bushmaster and

the two snakes are often mistaken one for the other. For this reason, and because the boa is an excellent food source and relatively easy to catch, this snake deserves some discussion. The boa constrictor is second in size only to the anaconda among the serpents of the Americas. It is a handsome snake, particularly in South America where the markings are a combination of pale tan and dark brown or black. The paler marks are arranged in a series of boldly defined, elongated saddles on the back. The dark markings give way to a rich, reddish color toward the rear of the body where brick red or crimson may be marbled with darker and paler hues. Central American specimens are usually much darker, with smaller and more obscurely defined saddles. One variation, defined as



ESTIMATING DISTANCE AND AVERAGE ANGLE OF DEPARTURE

(1)
Figure 95. Bypassing obstacles.

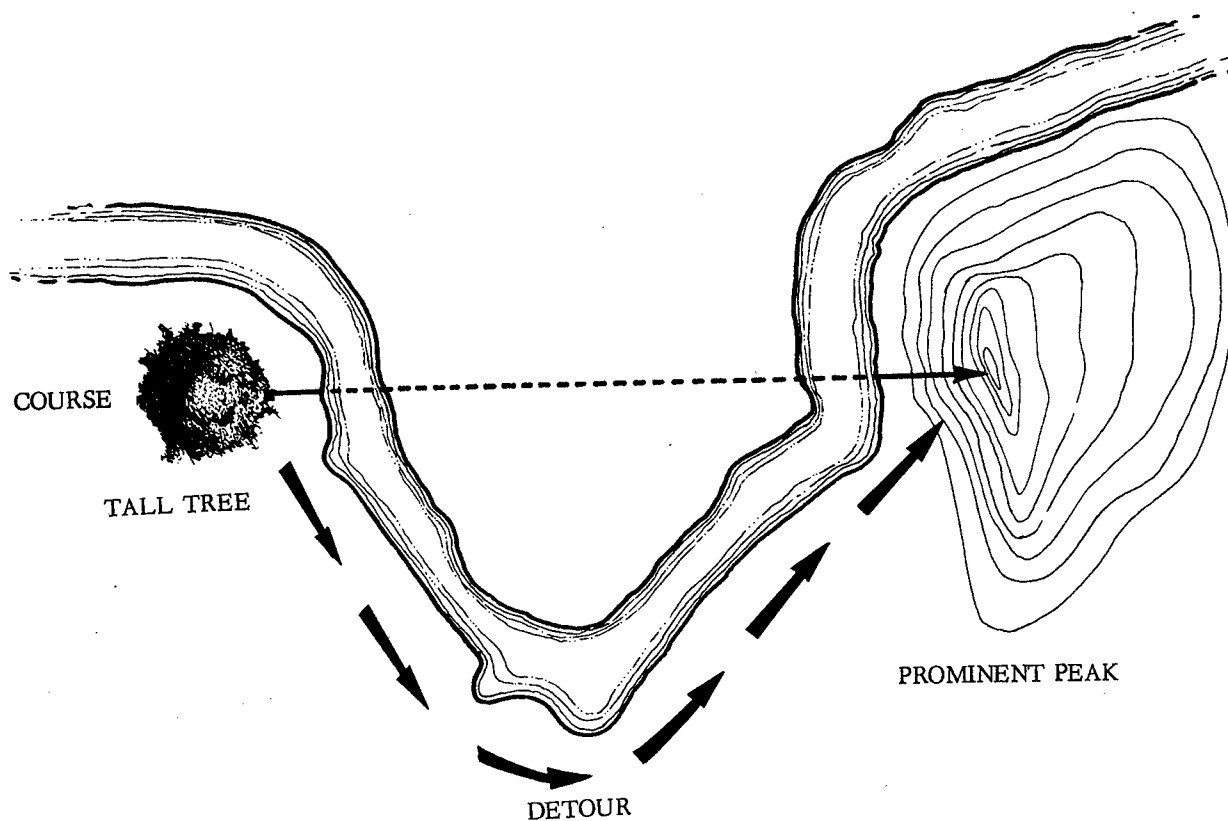
a sub-species is olive brown with black markings. A dark bar from eye to eye and a central band on the head from a cross-like marking. The boa of South America seldom attains a length in excess of 12 feet, but in Central America it grows to 15 feet. The boa constrictor, even though a non-poisonous snake, can be harmful to individuals, not necessarily by his ability to kill by constriction, but by the infection which could result from a bite. When an individual is bitten, the tendency to jerk away from the snake could cause the snake's teeth to break off under the individual's skin, resulting in infection if not properly treated. Figures 93 and 94 show typical boa constrictors.

c. Snakes of the Asian Jungles.

- (1) *Cobras*. The cobras are members of the viper family. Common species are the King Cobra and the spectacled cobra found in India, Southern China, and the Malay Archipelago and the Philippine cobra. Cobras are fierce, aggressive and among the most venomous snakes. They hurl themselves into an upright position when

annoyed, the neck dilating, or spreading instantly. Not all cobras can spread the neck so widely as the King Cobra, which is also the largest species, up to a length of 18 feet. The markings of cobras are generally brilliant, varying from yellow-brown or olive-green with back bands or patches of reddish-orange at the throat. Cobras will attack men.

- (2) *Kraits*. These snakes are very abundant in southeast Asia and are almost as poisonous as cobras. They are 4 to 5 feet long, black or dark brown in color, with tan or yellow bands across the back. A ridge extends down the back, topped by a row of large scales. The head is small and the skin surface is smooth and glistening. Kraits are nocturnal in habit and like to cover themselves with warm dust on trails and roads. They attack without coiling.
- (3) *Russel's Viper*. This snake is slow and sluggish but rivals the cobra as a killer among oriental snakes. The venom coagulates the red blood cells and causes death from hemorrhages, tetanus, or gastric disturbances in from 1 to 14 days. Russel's



USING A PROMINENT LANDMARK AS A GUIDE

(2)
Figure 95—Continued

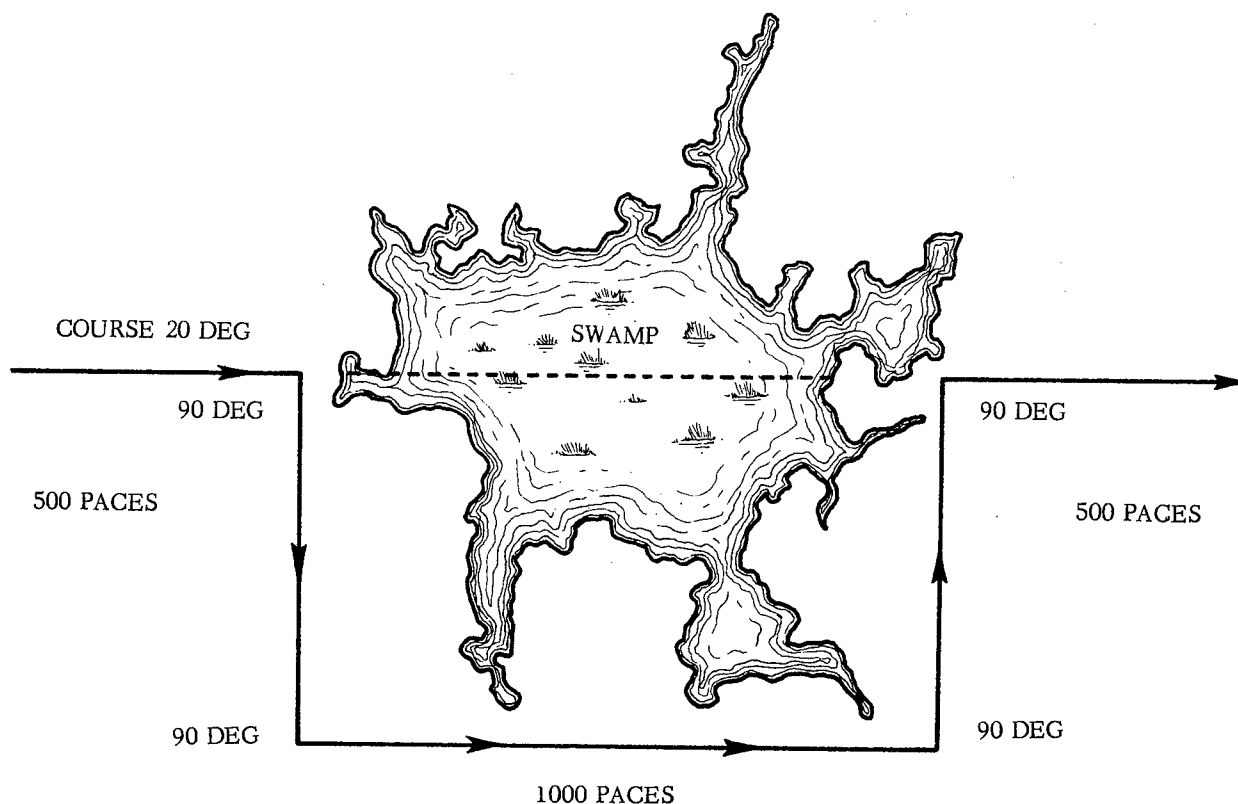
viper is a rich tan color with three rows of black rings bordered with white or yellow running the entire length of the 5-foot body. Although this viper usually avoids thick jungle it is found in the plains adjacent to the jungle and even in woods as high in elevation as 7,000 feet.

- (4) *Pythons*. The Regal Python of the Malaysian jungles is the largest known snake, reaching a length of 25 feet. The glistening skin of this snake is covered with an intricate yellow-brown and black design. The head is brown with a narrow black line extending backward from the snout, and the eyes are red with vertical pupils. The Regal Python is a constrictor and is not poisonous. Since most adults weigh around 200 pounds, the Regal Python is

an important food source. The Indian Python which is also found in Ceylon, is shorter than the Regal. It has two distinct types of coloration, one dark olive with black markings, the other tan, marked with olive-brown and usually showing a pinkish line on either side of the head.

d. *Snakes of the African Jungles.*

- (1) *Mambas*. These snakes are found in the central African forests and the South African bush and are among the most dangerous of the African snakes. They are tree cobras, whip-like in appearance, extremely active, and attain a length of 10 to 12 feet. Coloring is either greenish or black.
- (2) *Puff Adder*. This snake is orange-brown in color and averages about 4 feet in length. It likes to lie concealed on jungle trails and



COMPENSATION BY PACES AND RIGHT ANGLES

(3)
Figure 95—Continued

makes no effort to flee, if stepped on it responds viciously. The name comes from the habit of the snake of hissing violently with each breath. Coloration varies from sooty black chevrons separated by cream-colored crescents to dull buff with dark brown or gray chevrons.

- (3) *Gaboon Viper*. The gaboon inhabits the whole of tropical Africa. The eyes are silvery white and the pattern of the skin looks like it is woven. On the back are oblong, buff markings which are enclosed within irregular brown rhombus. This pattern is enclosed by a chain of irregular, purplish markings. The head is brown and on the sides of the body triangular purplish

blotches margined with brown can be seen. It rarely exceeds 30 inches in length.

- (4) *The Rhinoceros Viper*. This snake inhabits tropical West Africa. Its skin is rich olive thickly peppered with black. The top of the body is punctuated by pale blue blotches and orange-yellow bands; on the sides are ruddy-brown triangles. This coloration is brilliant and beautiful but this 4-foot long snake is dangerous. The name comes from the two blunt horns on the snout.

e. Snakes of Australia.

- (1) *Black Snake*. The 5-foot Australian black snake is a slender species with neck ribs that form a hood about half as broad as



Figure 96. Patrol moving through fern swamp. Although horizontal visibility of these men is severely limited in this type of vegetation notice how easily they are detected from above.

that of a cobra. Its smooth scales are blue-black on the back while the underside is a bright red. These snakes live in marshes and are dangerous.

- (2) *Tiger Snake*. The name of this snake comes not so much from its ferocity but from the banded color design on its skin. This snake, which is considered to be one of the most virulent of all serpents, is common in Australia. The scales are smooth and the markings somewhat variable, usually olive or brown with dark cross-bands. They are irritable and strike swiftly.
- (3) *Death Adder*. This snake has a short, stout body with keeled sides and a head that is flat and distinct from the neck. The eye has a cat-like, vertical pupil. Most characteristic is the tail, the tip of which is flat-

tened, provided with enlarged, over-lapping scales and terminating in a long, thin spine. On its back its color is brown and yellow crossed by darker bands. It is found in the forests of New Guinea as well as Australia.

f. Snake Venom. Venom is actually a potent saliva derived from the paratid gland of the snake which is similar to the human salivary gland. The use of venom defensively is a secondary adaptation because its primary use is to kill and digest the prey. Hence, a snake uses up most of its venom in killing and consuming its victim. Venoms are complex proteins of high toxicity and act usually in the following ways: one, an effect on red blood cells and the walls of blood vessels, causing dissolution of the red blood cells and hemorrhages from the damaged capillaries; another, affecting the nervous system, inducing paralysis of muscles, especially the nerves which

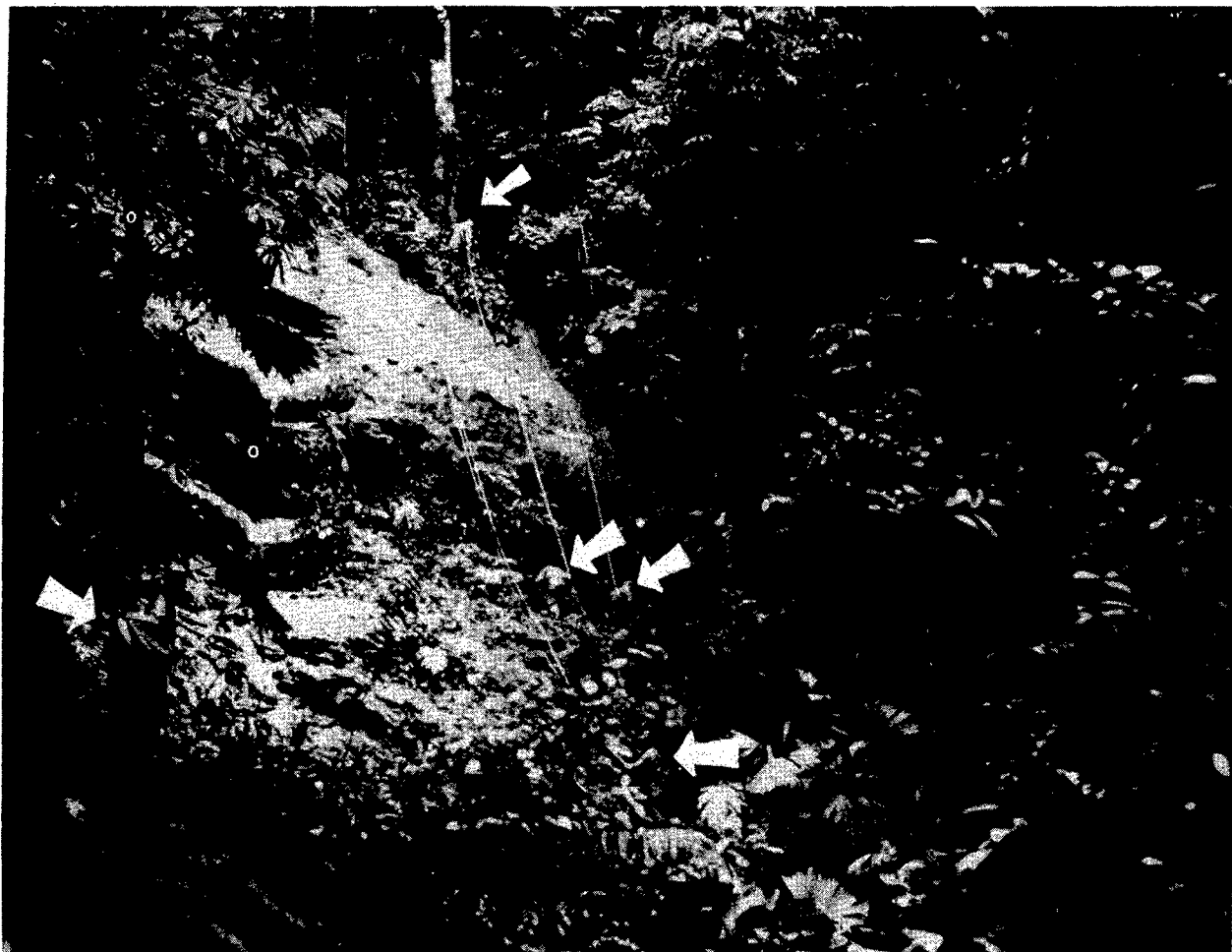


Figure 97. Typical cliff formations found in jungle terrain. Such ground formations demand that troops be adept at mountaineering techniques. Note the blending of individuals to terrain and vegetation. Arrows indicate the presence of five soldiers.

operate the respiratory muscles; and a third consisting of a general digestant action on all tissues, especially after the local death of tissue resulting from the other effects. The digestant action of venom is an advantage during suction treatment of snake bite by widening the fang channel and facilitating the outflow of tissue juice containing the venom.

g. Snake Bite. To minimize the chance of being bitten by a snake, troops should follow these general rules.

- (1) Never travel alone if it can be avoided.
- (2) Groups should travel with a minimum of four members; adequate help is then available if something should happen.
- (3) Exercise extra caution at night and when climbing or descending cliffs, ridges, or

trees where visibility is impaired. The following procedures should be followed when rendering aid to a snake bite victim:

- (1) Within practical limits, effect immediate, absolute immobilization of the affected part in a position below the level of the heart.
- (2) Place a constricting band (tourniquet) 2 to 4 inches closer to the heart than the site of the bite and reapply the constricting band ahead of the swelling if it progresses up the arm or leg. The constricting band should be placed tightly enough to halt the flow of blood in the superficial blood vessels, but not tightly enough to stop the pulse (arterial flow).
- (3) In case the bitten person stops breathing, prolonged mouth-to-mouth or mouth-to-



Figure 98. Another example of jungle cliff formation.

nose artificial resuscitation, as appropriate, should be employed.

- (4) Assistance from the nearest medical source or transportation of the patient to a treatment facility should be accomplished as soon as possible. Attempt to identify the snake. If the snake is killed, take its head and a part of its body to the medical facility with the victim.
- (5) If the individual bitten by a snake is on his own and/or medical assistance is not available, the following method or treatment apply:
 - (a) Employ treatment indicated in (1) and (2) above.
 - (b) Then apply mouth suction at once to the region of the fang holes, encompassing the area widely with the teeth and lips.

This procedure involves gentle massage with the teeth, as well as suction.

- (c) Do not make any incisions, since these may cause a more severe injury by severing an artery or a vein.
- (6) Do not panic. Mortality from snakebite, properly treated, is less than 1%. It is only 10% to 15% without any treatment—chances are good.
- (7) If a tourniquet must be left on over an hour (possible since it should not have been applied too tightly), release it for one minute, tighten again. Gradually increase the time “off” and decrease the time “on”. This action permits the body to receive and absorb any remaining poison gradually, allowing the body systems a better opportunity to counteract it.



Figure 99. Single strand rope bridge. Soldier is shown crossing a narrow, deep jungle river using the "British Crawl" method. It is important that the soldier push with the foot on the rope as well as pull with his arms to conserve strength.

32. Jungle Navigation

a. General. The principles of military map reading and land navigation as set forth in FM 21-26 apply in all types of terrain. It is not the intent of this manual to repeat the provisions of the standard manual on map reading; rather, the aim is to consider some aspects of navigation relevant only to overland movement in jungle and to emphasize some of the basic principles. Map reading and navigation in conventional terrain or open country, where landmarks are easily seen and recognized, are fairly straightforward. In the jungle it is possible to see for only short distances. For this reason, and the fact that maps of jungle areas are generally very inaccurate, the individual must be skilled in the use of the compass. Landmarks consist largely of jungle covered hills (making it difficult to distinguish one hill from another), streams, and rivers. However, as

in any kind of terrain, these landmarks are the surest guides in map reading.

b. Navigational Aids.

- (1) *Maps.* Because of the isolated nature of jungle terrain, the rugged contour of the ground and presence of the jungle canopy, survey is extremely difficult and is done mainly from the air. Although such a method of survey does not provide sufficient detail to show main hill features, ridge lines and streams are generally accurate. Individuals should be aware of the limited accuracy of jungle maps; however, they should be cautioned not to disregard the map as a navigational aid. Careful map study is an essential preliminary to jungle navigation. This study will usually reveal the best route to be taken and areas to be

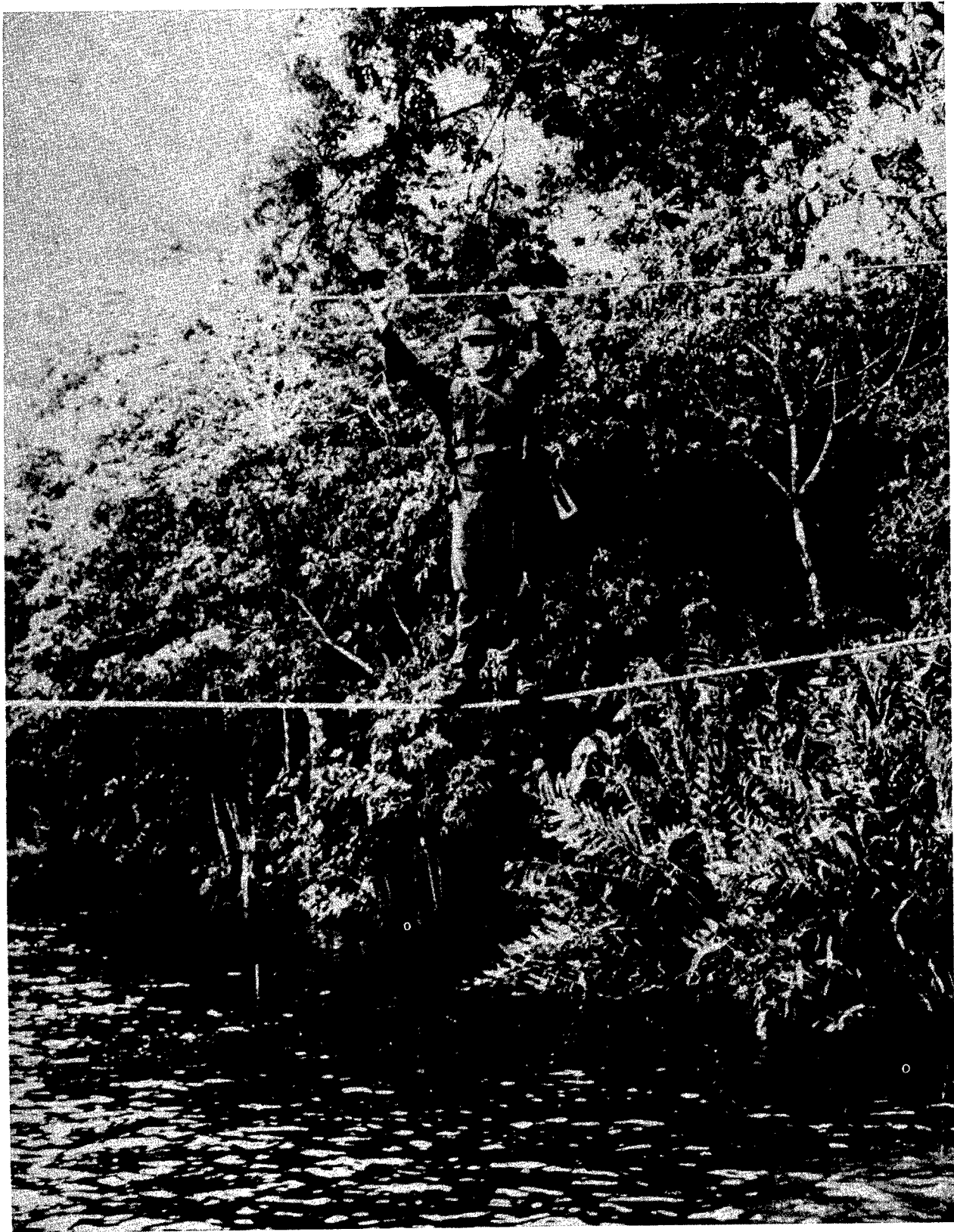


Figure 100. Double strand bridge. Notice that this soldier has oriented his weight forward against the hand rail and that the shanks of both boots are locked onto the tread rope.



Figure 101. Soldier being transported over a river by suspension traverse.

avoided. It will reward the soldier by helping him to visualize the lay of the land, to assist his sense of direction, and to increase his confidence. If this careful map study is not done before moving through the jungle, the chances of becoming lost are increased.

- (2) *Aerial photographs.* Complete aerial photographic coverage of a given jungle area is usually not available. However, if coverage of specific areas over which troops will move is made available it will prove to be a valuable check. Stereo pairs may be used with a stereoscope for contour determinations. It is important to check the dates of aerial photographs as trails and clearings can become overgrown in three or four months.
- (3) *The compass.* The value of the compass in the jungle cannot be overemphasized. A lanyard should be used and the compass

attached to the belt. It is vital that the soldier be taught to place complete faith in his compass and that the natural temptation to use sense of direction be avoided.

- (4) *Sun, moon and stars.* These may be helpful, but they will usually be obscured by the jungle canopy. The sun is an inaccurate reference when high, due to proximity of the equator in most areas and it should not be used with the watch/sun method. However, in early morning and late afternoon an approximate East or West bearing may be indicated by the sun.

c. *Navigational Technique.*

- (1) *Planning.* Map study can assist in route planning. The following factors should be considered:
 - (a) *Compartmentation.* It is easier to follow corridors than it is to cross them. Thus, a direct route from one point to another is convenient and fast only in flat jungle.



Figure 102. Snatch block with shell closed.

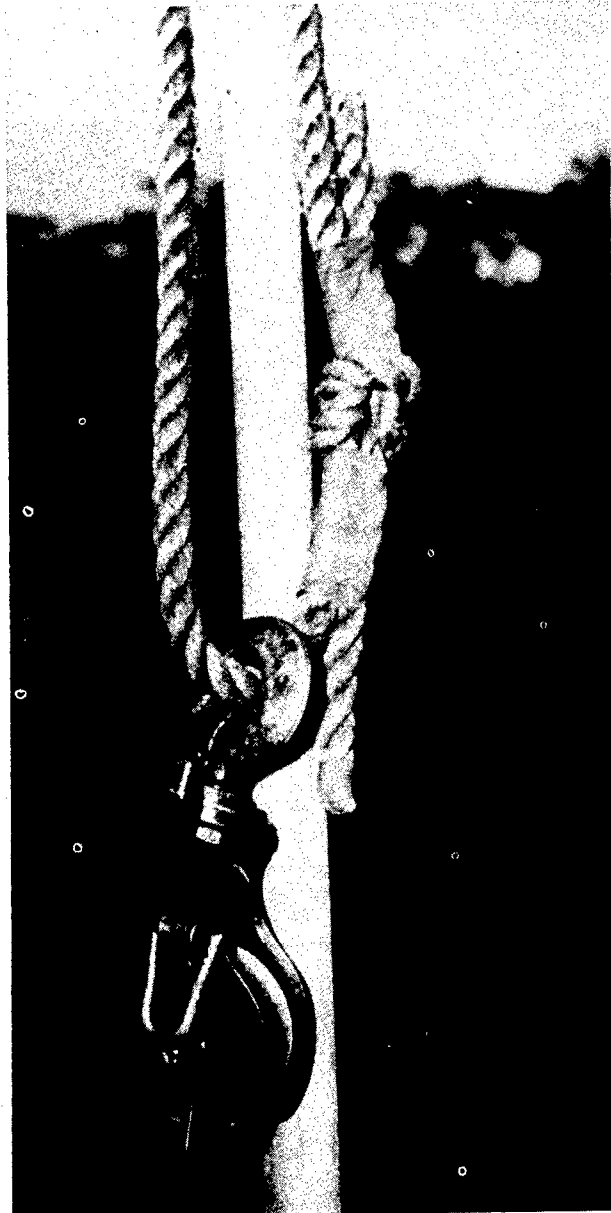


Figure 103. Snatch block with shell opened.

In hilly jungle, such a route may prove to be most demanding on the physical condition of troops.

- (b) *Ridge lines.* Tops of the ridges and hills usually contain sparser jungle than the valleys. Animal trails and native trails are often found on the ridges and, therefore, marching on ridges is usually easier, faster, and less tiring for troops. Once the effort of climbing a hill is over, troops can expect a comparatively easy march while moving along the ridge.

- (c) *River lines and stream beds.* While large rivers are useful aids to maintenance of direction, it is poor policy to follow them. They are always meandering, are bordered by dense jungle, and numerous, deep sloughs usually punctuate the banks. On the other hand, a stream bed may make a good approach route in upland forest when travelling over ridge lines. Troops should be cautioned about the danger of flash floods when using

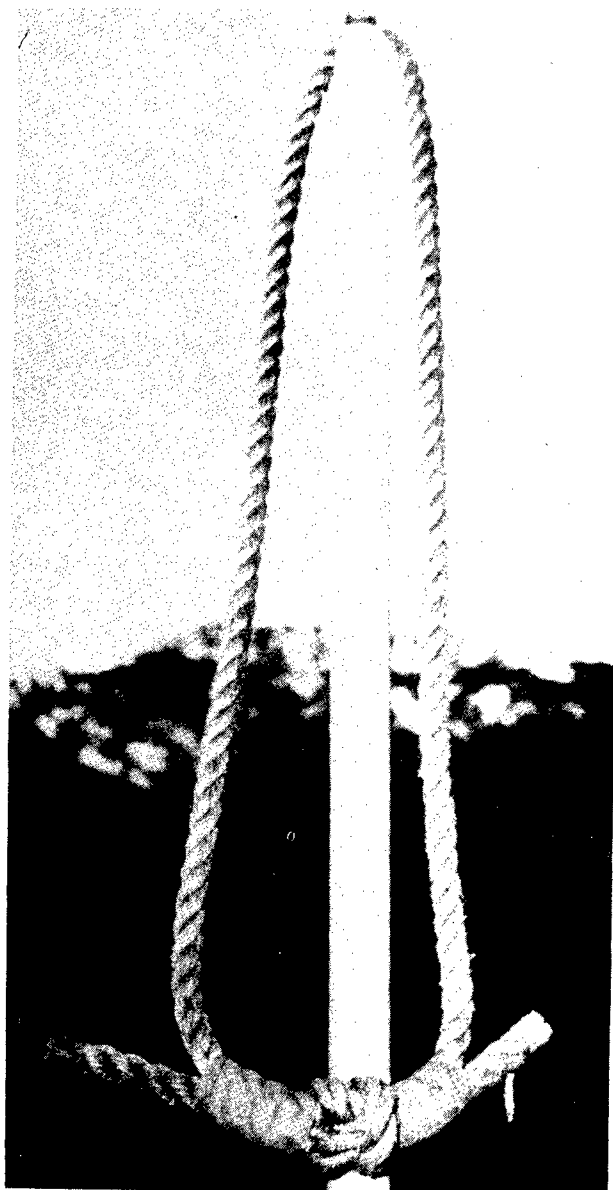


Figure 104. Sling hitch made from 1-inch manila rope for use with snatch block on suspension traverse.

stream beds as routes even in the dry season.

- (2) *Following a set azimuth.* The three most common methods used when following the readings of a compass are:
 - (a) Sighting along the desired azimuth, identifying an object forward that is on line with the azimuth and marching on azimuth line to the object.
 - (b) Holding the compass at waist level and walking in the direction of and on line with the set azimuth.

- (c) Sighting the desired azimuth and guiding a man forward until he is on line with the azimuth, then moving to him and then repeat the procedure.

Sighting on an object in line with the azimuth is undesirable in jungle terrain as all trees and bushes look alike. It is difficult to determine exactly which tree, for example, was sighted on once the compass team moves up. When holding the compass at waist level and walking on the azimuth line there is a tendency for the compassman to follow his natural drift which will be either to the left or right while moving. If this method is used, the compass should be set as in night navigation with the long, luminous line placed over the luminous North arrow when the desired azimuth is under the black index line. The method of sighting along the desired azimuth and guiding a man forward until he is on line with the azimuth is the most accurate to use in jungle during the daylight hours. In this manner the compassman guides a member of the compass team forward and sights on him. By using this method, there is a definite aiming point and the compassman will not become confused with others. In addition, the compassman can release the compass on its lanyard and use both hands, if necessary, as he moves up to the guide.

- (3) *The navigational team.* Because of the difficulties inherent in navigation in the jungle, it is recommended that personnel charged with the responsibility of directing a troop column be organized as follows:
 - (a) *Guide*—The guide is sent to the front to clear the way for movement and to assist the leader in maintaining direction. This is the man on whom the compass is sighted.
 - (b) *Compassman*—The compassman is the leader. He sets the azimuth, maintains direction, and supervises the actions of the team.
 - (c) *Map reader*—The map reader maintains the team's location on the map and records pertinent information. In addition, he can also be used as an additional pacer.



Figure 105. "X-frame" made from jungle materials for poncho brush raft. Notice the GREEN (living) vegetation that has been cut for the raft.

STICKS USED IN LIEU OF RIFLE
ACCORDING TO TACTICAL SITUATION

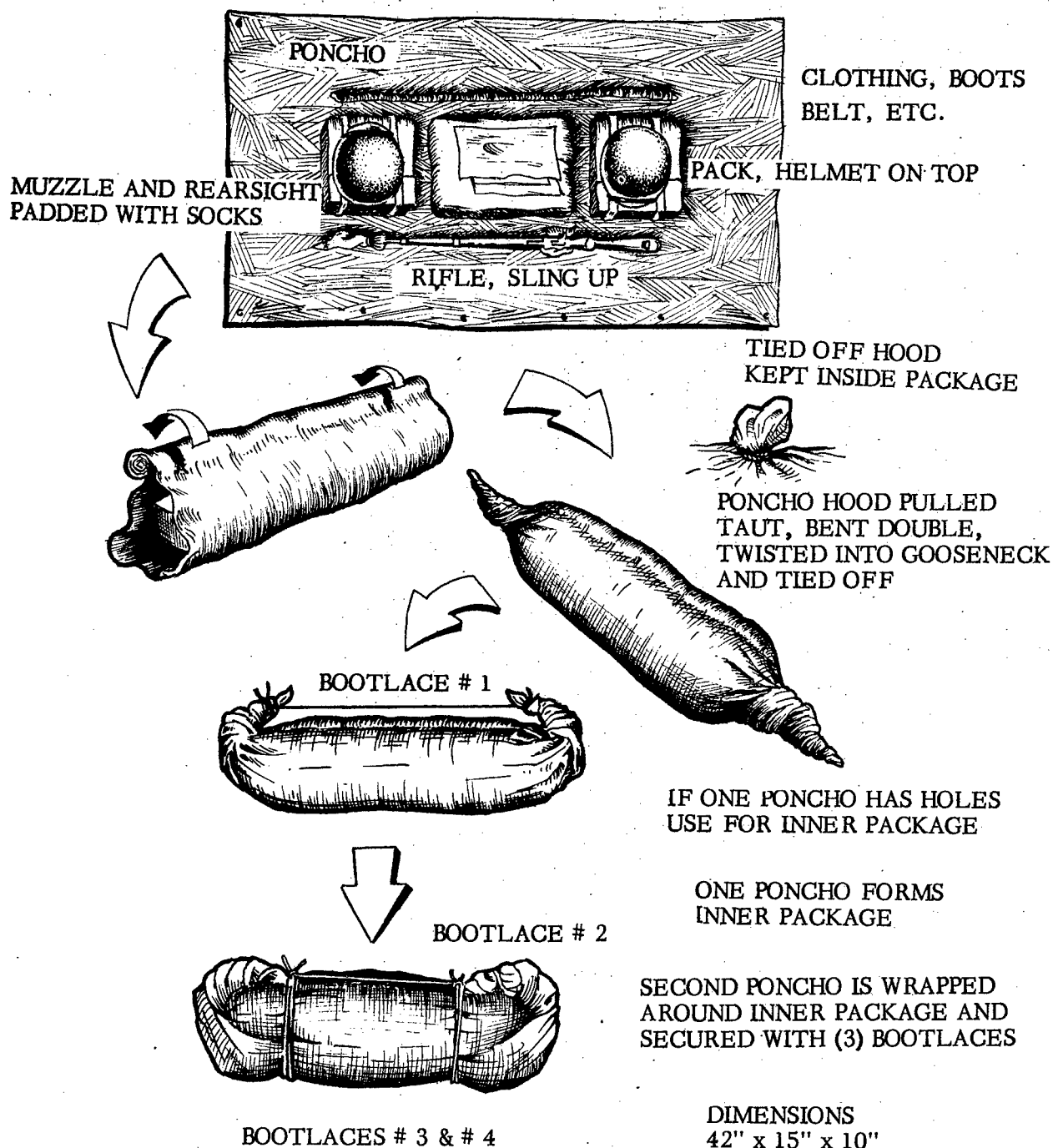


Figure 106. Australian poncho raft.

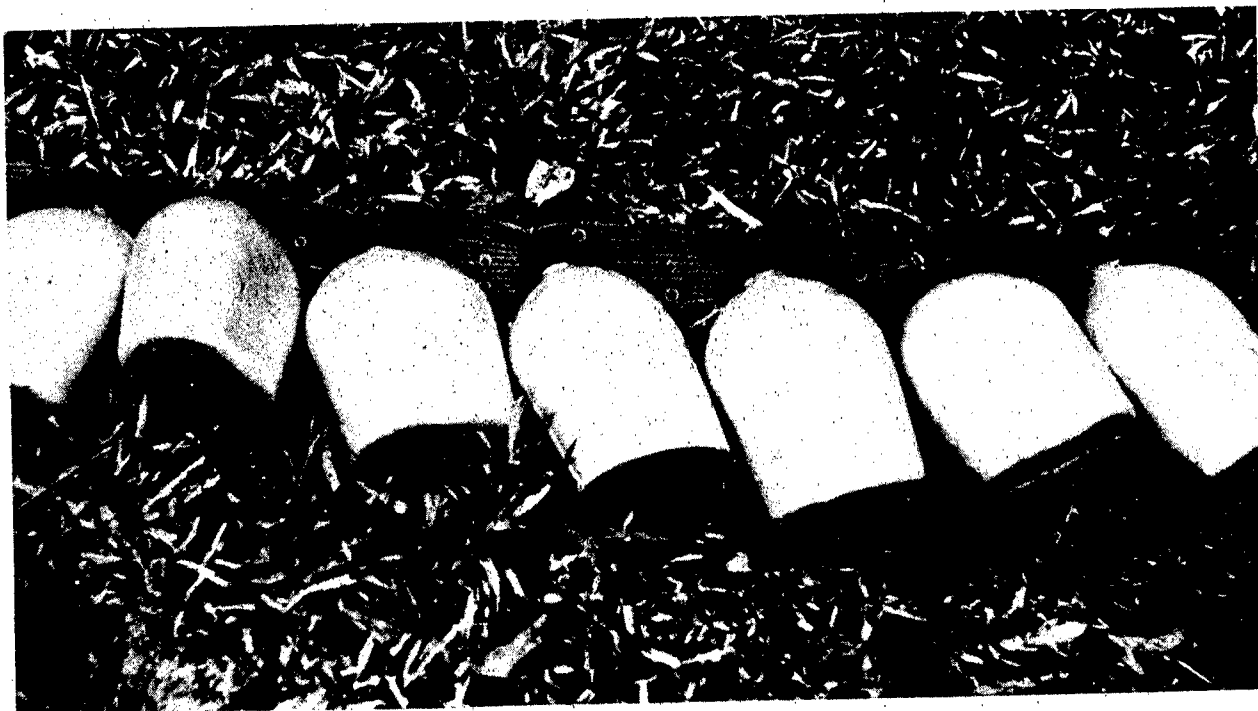


Figure 107. Improvised canteen safety belt.

(d) *Pacer*—The pacer keeps an accurate record of the distance covered. This can be done most reliably by tying a knot in a string for each 100 meters traversed by the team.

(e) *Measuring Pace*. Each soldier should know what his pace ratio is, i.e., the individual should know how many steps he must take to walk 100 meters. This can be determined by counting the number of steps necessary to walk a carefully measured 100 meter distance. Because of the extreme unevenness of terrain in the jungle, detours, obstacles, and the difficulty of maintaining a measured pace, it is recommended that individuals increase their pace ratio by one half to compensate for these variables. For example, if a soldier must walk 120 steps to cover 100 meters on flat ground, his pace ratio for the jungle would be 120 plus 60 ($\frac{1}{2}$ of 120) or 180 paces.

(f) *Provisions for night movement*.

1. Luminous tape should be attached to the back of each team member's uniform. It is recommended that two strips, each the size of lieutenant's bars,

be attached to the back of the headgear. Two strips will aid depth perception and reduce the hypnotic effect brought about by only one strip.

2. When the night is exceptionally dark, troops should close up and hold onto the pack or belt of the man immediately preceding. This prevents straggling and separation of individuals.
3. The compass should not be worn around the neck but should be affixed to the belt.
4. The pacer should carry a piece of string or rope and tie a knot in it for each 100 meters traveled.
5. The guide should carry a long stick with luminous tape affixed to the end. This stick serves a dual purpose as it can be used to indicate the guide's location as he moves and the guide may use the stick as a probe. This probe may prevent serious injury as it will warn the team of any obstacles or sudden drop-offs that might be encountered.
6. The map reader should assist the pacer in maintaining an accurate account of distance traveled during night movement.

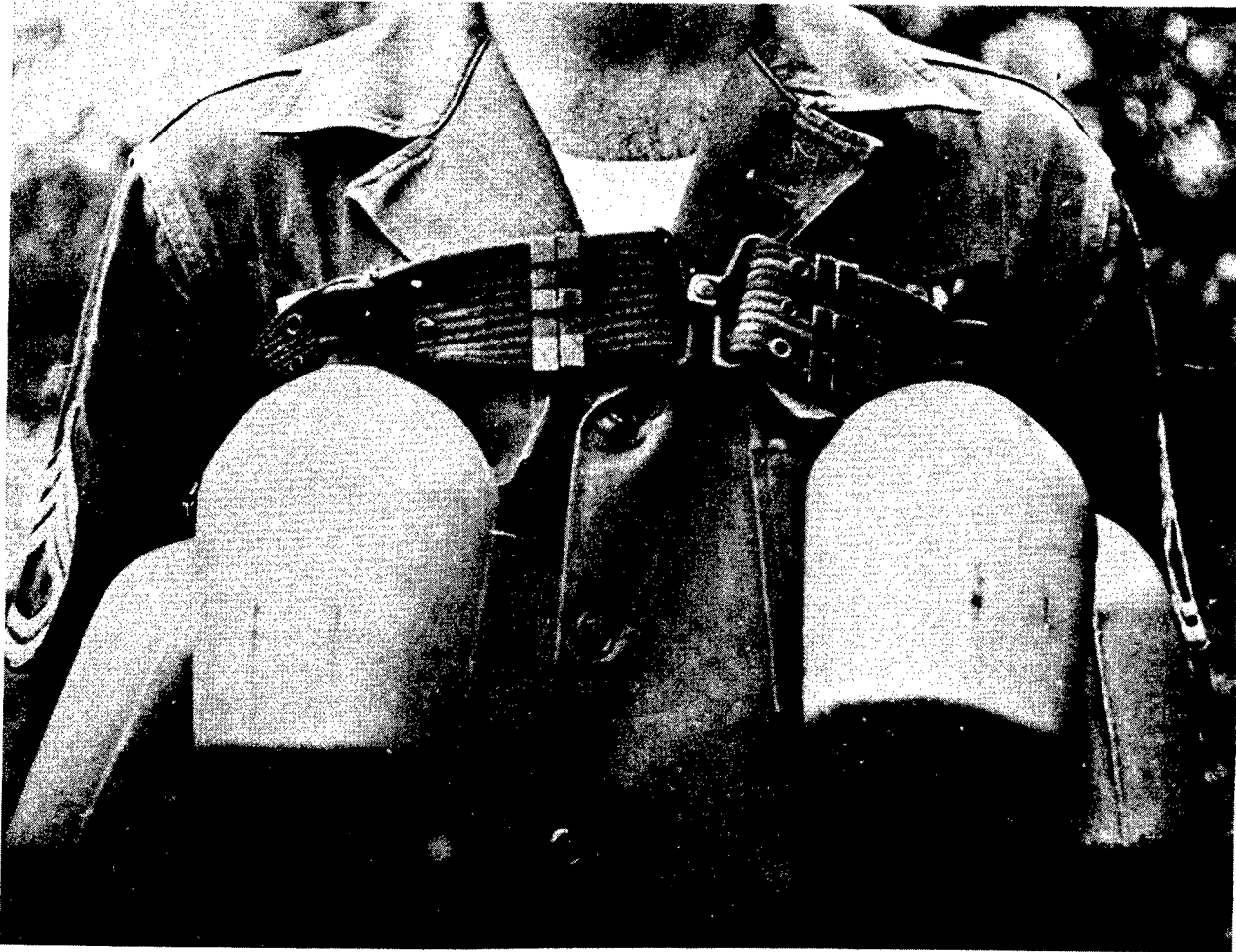


Figure 108. Correct position of the canteen safety belt before entry into the water.

- (4) *Actions during the march.* Once the march begins, checking of position and progress should be continuous. The following means of checking should be used:
 - (a) All features such as hills, ridge lines, and rivers should be checked as they are reached and identified on the map. The direction of flow of all encountered streams should be noted and checked with the map.
 - (b) Trails should be identified on the map. If they are indicated on the map they should be regarded with suspicion for it is easy to place too much confidence in trails which may not be properly marked on the map.
 - (c) Firebreaks and jungle edges adjacent to grasslands or cultivations should be noted and compared with the map.
 - (d) Pacing should be checked with the elapsed time from the beginning of the march and the type of country traversed. Common sense with regard to these factors will lessen the tendency to overestimate the distance traveled.
 - (e) Troops must understand that fatigue is the greatest enemy of good navigation. To blunder on, hoping for the best, is a sure way to get lost.
- (5) *Action if lost.* The feeling of being lost tends to create mental panic. Troops who have reason to believe that they are lost should:
 - (a) Sit down, calm down, and begin to appraise the situation.
 - (b) Make every attempt to locate the position on the map.

- (c) After a careful map study, make a plan which will take them to one of the recognizable terrain features such as a river. Move to it and then proceed to the march objective.
- (d) Control panic at all times.
- (6) *Bypassing obstacles.* Quite often obstacles encountered in the jungle force a compass team or unit to detour from the planned course. There are several methods of circumventing obstacles without losing the original course completely.
 - (a) The first method is estimating distance and average angle of departure. Upon finding that the desired course intersects an insurmountable obstacle the compass team can deviate right or left of the original azimuth a known number of degrees and move a known distance until it is apparent that the obstacle has been bypassed. At that time, the compass team reverses the direction of the deviation back towards the original course. The team then follows the initial azimuth. In effect, the compass team has moved on the two legs of an isosceles triangle around the obstacle. This method is best illustrated by the following example ((1), fig 95):

Hypothesis: If the angle of departure A is 50° to the left then the azimuth of the first leg is $40^\circ - 50^\circ = -10^\circ$ or 350° ; upon reaching point B or the deviation back to the original course the azimuth for 800 paces would be $40^\circ + 50^\circ = 90^\circ$.

This particular means of detouring obstacles is best suited for open and semi-open country and is not often possible in dense jungle.

- (b) Another means of circumnavigating an impassible obstacle is using a prominent landmark as a guide. This method requires that members of the compass team be readily able to observe and identify prominent terrain features; this is difficult to do through the dense vege-

tation of the jungle. This method is illustrated in (2), figure 95.

- (c) Compensating by paces and right angles is a third means of bypassing obstacles. Upon encountering an impassible obstacle the compass team moves at a right angle (90°) to the original course until the flank of the obstacle has been reached. At this time the compass team again moves at a right angle onto a course parallel to the initial course until the obstacle is cleared in depth. Upon bypassing the obstacle the team moves at a right angle until it has returned to the original course. The drawing in (3), figure 95 gives a schematic indication of how this is done.

33. Crossing Jungle Obstacles

a. *General.* Previous discussion has emphasized the fact that jungle terrain presents obstacles of the greatest severity and variety to any operations conducted therein. For all the special considerations that must be taken into account when preparing individuals and units for jungle combat it will be seen that one facet of warfare is common to all operations by ground forces in any type of terrain. This is the principle of war which is called *maneuver*. All other principles and techniques of warfare are corollary to this consideration for jungle operations. In the jungle, this principle of war is most difficult to apply. Jungle operations are usually characterized by deep penetrations of small units operating independently in matters of maneuver, tactics and resupply. The individual soldier will usually be required to man-pack his own weapons, ammunition, rations, and special equipment. It is obvious that if special equipment is used it must be kept to a minimum. The soldier must be conditioned to the fact that movement in the jungle will be arduous, that obstacles will occur as the rule and not the exception, that he will have to provide his own means to overcome these obstacles and that no obstacle is insurmountable or impenetrable. To enable the soldier to meet this criteria, he must be trained to—

- (1) Recognize and identify the obstacle as to type.
- (2) Improvise a means to negotiate the obstacle using a minimum of equipment and/or only the materials at hand.



Figure 109. Improvised poncho safety belt.

- (3) Overcome the obstacle with a minimum expenditure of effort and time.

b. Types of Jungle Obstacles. There are primarily three types of obstacles that will impede movement in the jungle. These are:

- (1) Vegetation and swamps.
- (2) Steep hills and cliffs.
- (3) Wide rivers and streams.

c. Methods of Crossing the Different Types of Obstacles.

- (1) *Vegetation and swamps.* When confronted by especially thick vegetation or swamps the jungle soldier can pass through by employing map study, accurate plotting of the desired course, security during movement, and accuracy in navigation (fig 96). In some instances, the tactical situation and time element may allow detours around especially difficult areas of vegetative growths. It should be emphasized in training that vegetation is not as difficult an obstacle to overcome as the other types mentioned in *b* above. Exceptions to this are vast expanses and growths of mangrove swamps and bamboo forests.

- (2) *Steep hills and cliffs.* Movement often must be made cross compartment or detours and

rerouting is required. As a consequence, the jungle soldier must possess the knowledge and develop the skill to cope with obstacles presented by rugged elevation and ground contours (figs 97 and 98). Knowledge of basic mountaineering techniques is most essential. These basic mountaineering skills may be classified as "unassisted techniques" (mountain walking and balance climbing) and "assisted techniques" (rappelling and belays). The proper methods for training individuals and units in the execution of these skills are discussed in detail by FM 21-50 and FM 31-72.

- (3) *Wide rivers and streams.* Water barriers may be crossed by several means. Some of the expedient means are:

- (a) *Fording.* If a wide, shallow (less than 1.5 meters deep) stream is encountered, a secluded shallow spot for fording should be selected. Security and reconnaissance elements should cross first and secure the far bank. They should move rapidly across in a column, the lead man probing ahead with a fathoming stick. If the water is flowing rapidly, a safety rope should be secured on both banks,

when possible, to prevent falling and being carried downstream.

- (b) *Rope bridges* (figs 99 and 100). Rope bridges provide temporary and improvised systems for crossing streams, small rivers, gorges, etc., where the span is not great, the traffic not too heavy, and where there would be a saving in time over crossing methods, or by locating and using a bypass. For a detailed description of the various types of rope bridges, to include construction, employment and utilization, see FM 21-50, and FM 31-72.
- (c) *Suspension traverse*. The suspension traverse can be used to move a relatively large number of troops (a rifle company) or heavy equipment over wide rivers, ravines and up or down cliffs in a short period of time. Because of the heavy and bulky equipment required for this device, in jungle operations it would be practical only if the necessary materials could be transported to a pre-selected site by air or surface means (watercraft, pack horses or native porters) prior to arrival at the site by the using unit. The traverse may be made on a plane varying from the horizontal to the near vertical. To install a suspension traverse a suitable route for the traverse must be reconnoitered, with emphasis placed on the location of suitable anchor points. These must be of a sufficient height to allow clearance of loads being transported over any obstacles. The static line must be carried to the upper, or farther anchor, by a single man or a climbing party, and secured. It is then secured to the other, usually the lower, anchored and tightened by use of a tightening knot. If nylon climbing rope is to be used as a static line, it should be used double to minimize sagging and offset shearing or burning inherent to nylon rope thereby increasing the safety margin. A $\frac{3}{4}$ inch or 1 inch "manila" rope should be used for installations which will receive heavy use. A carrying rope is then made by tying the ends of a sling rope with a

square knot and half hitches, doubling the rope thus formed, and placing the square knot in the upper third. An overhand knot is tied into the loop above the square knot and a second overhand knot is then tied slightly below it. The belay rope is tied to the center of the three loops of the carrying rope and then a snaplink is inserted into the upper small loop and into the static line. To secure either loads or troops to the static line this carrying rope is merely passed through the seat or lashings and the larger loop snapped into the snaplink or the static line. When the man or load has been hooked onto the static line, a belayer lowers the load by using a body belay, a belay through a snaplink, or around a tree, and stops him gradually as he nears the bottom. If it is a steep traverse, and the descent is rapid, protective padding must be used by the belayer to reduce the friction on the body. If the load is being raised or the traverse is horizontal, it will be necessary to have a belay rope from both anchor points and to pull the load up or across and to retrieve the carrying rope. A suspension traverse can also be installed to utilize block and tackle. This combination of rope and equipment is especially suited for transport of troops as it is rapid and safe. Rope is reeved or threaded through blocks, which may have one or more "sheaves" or rollers. Blocks are used to reverse the direction of ropes, and usually consist of a shell (frame) which supports the ends of a sheave pin on which the sheave (a grooved pulley) revolves. A hook, usually free to revolve, is attached to one end of the shell of the block. A "snatch block" is a simple sheave block made so that the shell opens on one side at the base of the hook to permit a rope to be slipped over the sheave without threading the end of it through the block. To attach a load to the hook of the block a "sling" is used. The most efficient sling and the easiest to construct is the "endless sling". These devices are made by splicing together



Figure 110. One method for wearing the poncho safety belt.

the ends of a piece of rope, usually one-inch manila. When an endless sling is passed around an object that is to be lifted and both remaining loops are slipped over the hook of a block, this arrangement is called a "basket hitch". This type of hitch lends itself well to movement of personnel on the suspension traverse. Figure 101 shows a suspension traverse installed to utilize block and tackle. Figures 102, 103 and 104 show the details of the sling and snatch block combination.

- (d) *Crossing by surface means.* There are several ways that the jungle soldier may cross deep streams and wide rivers using surface means. A three-man pneumatic rubber raft may be used to shuttle equipment by securing the raft fore and

aft with ropes tied to each shore. The raft may be used to carry weapons and equipment. Members of a group hold on to the sides of the vessel and are towed to the far bank. The standard air mattress can also be used to float individuals or equipment across bodies of water. An excellent expedient is the poncho raft. There are two types and because of their efficiency and ease of construction they have an important application in jungle operations. To insure a common and complete comprehension of methods used to fabricate these expedients, construction steps should be performed in sequence.

- (e) *Poncho brush raft* (fig 36). To construct this raft, use the following procedure:



Figure 111. Alternate method for wearing the poncho safety belt.

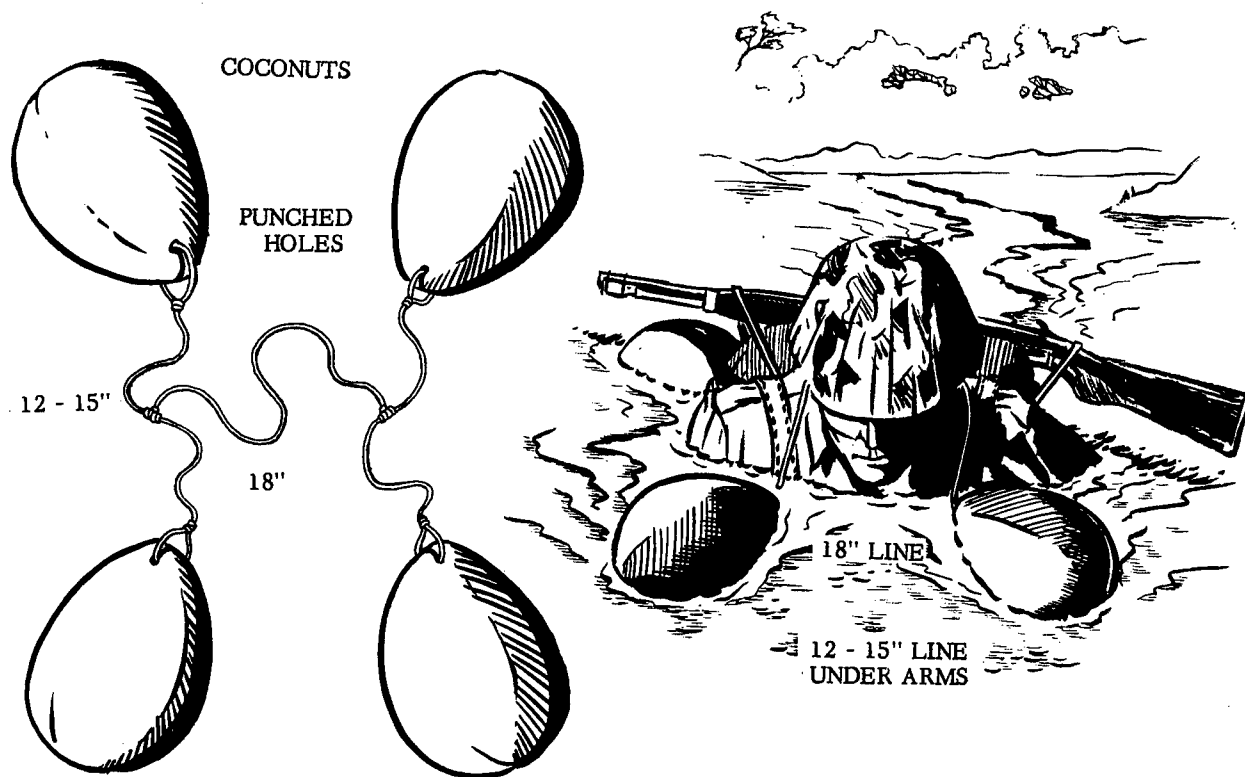


Figure 112. Coconuts tied together to form expedient flotation device.

1. Obtain two ponchos and tie the neck of each tightly by using the drawstring.
2. Spread one poncho on ground with hood up so that it will end up inside the raft.
3. Cut fresh, green brush (avoid thick branches or woody stalks) and pile on poncho to a height of approximately 18 inches.
4. Place an X-frame made of small saplings on brush. Anchor this frame by tying drawstring of poncho to the center of X-frame (fig 105).
5. Pile another 18 inches of brush on top of X-frame.
6. Compress brush slightly and fold up poncho, tying ropes or vines diagonally across from corner grommets and straight across from side grommets. The sides of the poncho will not touch.
7. The second poncho is spread on the ground, with hood up, adjacent to the bundle made of the first poncho and

brush. This bundle is rolled over into the center of the spread poncho and the second poncho is tied across the sides and diagonally across corners. This raft will safely float 250 pounds and is very stable. When launching the raft, take care not to drag it on the ground thereby causing punctures or tears. An empty canteen tied to one end of a rope with the other end tied to the raft assists in towing.

- (f) *Australian poncho raft* (fig 106). Where brush is not available or when speed is essential, this raft can be constructed quickly using only individual equipment for bulk. It is more waterproof than the poncho brush raft but will sustain only about 80 pounds of weight. It is constructed as follows:

1. One poncho is placed in the ground with the hood facing up, after closing

the neck opening and tying it off with the drawstring.

2. Individual weapons are placed on each side of the neck opening, butt-to-muzzle, and running the long axis of the poncho. Operating rod handles face toward the center.
3. Laces are taken out of two individual's boots if vines or other tying materials are not available. Socks are used to pad the front and rear sights of weapons.
4. Packs are placed inside and at the ends of the two weapons.
5. Clothing is neatly folded and placed inside the weapons and the packs. Care should be taken to place clothing as level as possible.
6. Harness and webbing are placed on top of clothing. Helmets, if worn, are placed on top of the packs.
7. Boots are placed on top of the harness.
8. Members of the team move to the flank of the raft and fold up sides of poncho over the top of the equipment. Snap together all snaps on the sides.
9. Working together at the center, the team rolls the sides of the poncho towards the equipment. Roll tightly and together so that the roll does not become loose. Roll down to the equipment.
10. Roll out to both ends, keeping poncho as tight as possible. At the ends, twist the poncho to form a pigtail. Keep the pigtail tight.
11. While one member of the team holds the pigtails to keep them from untwisting, the other member ties the pigtails tightly together with boot laces, vines or other tying material.
12. Spread the second poncho on the ground, neck closed and facing up. If more buoyancy is desired, brush and grass may be placed between this poncho and the first one.
13. Place the equipment bundle formed with the first poncho in the second poncho with the pigtails facing downward.
14. Roll the sides of the second poncho the same as the first poncho. Tie off the

pigtails with the second boot lace or other tying material.

15. The third and fourth boot laces are tied around the ends of the raft, going underneath the boot lace tied to the pigtails.
16. The raft is now ready to be placed in the water.

(g) *Other flotation expedients.* For non-swimmers, weak swimmers or injured personnel, there are several expedients which will provide means to cross a river in the event no other equipment is available or if there is no time to construct a brush raft.

1. *Canteen safety belt* (figs 107 and 108). If at least eight EMPTY water canteens are securely affixed to the pistol belt or tied to a rope which would then be used as a belt, a weak swimmer or a nonswimmer will be able to float his body in the water. Care should be taken to insure that the caps of the canteens are tightly screwed on and that each cap has a cork or plastic washer. Metal canteens can be very noisy when used in this manner; troops should, therefore, insure that the tactical situation will permit employment of this expedient.
2. *Poncho lifebelt.* If green vegetation is tightly rolled inside a poncho and the ends folded over and made water tight, an improvised lifebelt will result. The poncho should be rolled up like a sausage at least 8 inches in diameter. Worn around the waist or across one shoulder and under the opposite arm like a bandoleer such a belt will easily support a man in the water (figs 109, 110 and 111).
3. *Water wings.* Two or more plastic bags of the type used to pack radio batteries can be used to fashion water wing expedients. Care must be taken that the mouths of the bags are securely tied and that the bags are properly affixed to the soldier's body. Four of these bags can be tied to two poles, the poles lashed about a foot apart with vine, wire or rope and a raft-type float will

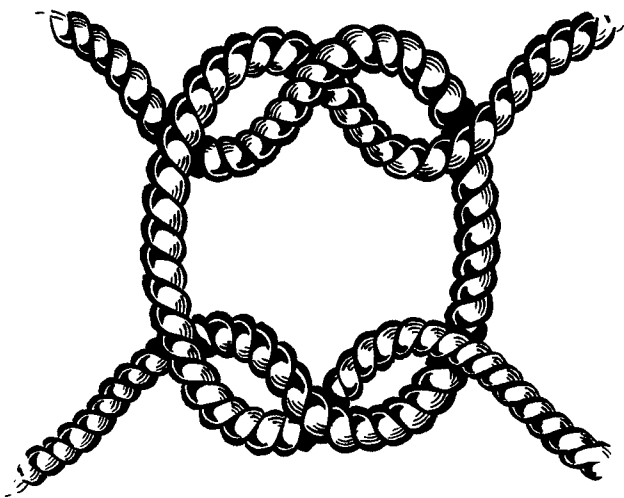


Figure 113. Square knot. To join ends of ropes of equal diameter.

result. Other items such as ammunition boxes, canisters and even coconuts (fig 112) can also be used as expedient flotation devices.

34. Ropes and Knots

a. General. To further develop individual self-reliance, training should be conducted in the utilization and employment of ropes and lashing and rigging techniques. Particular emphasis should be placed on the proper choice of ropes to suit a particular requirement with equal stress on the knots that best serve the needs of the tasks to which ropes are assigned. TM 5-275 and TM 5-279 present a detailed discussion of the technical aspects regarding the theories of lashing and rigging. FM 21-50 and FM 31-72 describe the various combinations of ropes and knots that are used for mountaineering activities and the construction of rope bridges.

b. Elements of a Rope. The three elements in a rope are fibers, yarns, and strands. A number of fibers are twisted together to form a yarn, then a number of yarns are twisted to form a strand. Finally, a number of strands are twisted to form a rope. The direction of twist for each successive element is reversed. The reason for the reverse twisting is to put the rope in balance and to prevent elements from unlaying when a person or load is suspended from it.

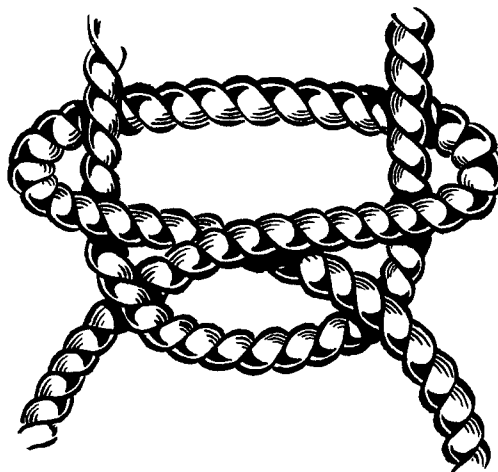


Figure 114. Sheet bend. To join wet ropes and ropes of unequal diameter.

c. Types of Ropes. Descriptions will be limited to synthetic and vegetable fiber rope.

- (1) *Synthetic fiber (nylon).* Nylon rope is most commonly used in climbing. The rope is $\frac{7}{16}$ inch in diameter and is issued in 120-foot lengths. The actual breaking strength when dry averages 3,840 pounds (5 percent variable factor). Strength is reduced by 18 percent when the rope is wet. Nylon sling ropes are commonly used in 12-foot lengths. They are used by the individual soldier for safety and utility and are the same diameter as the nylon climbing rope.
- (2) *Vegetable fiber.* By reason of its availability in tropical areas, vegetable fiber ropes are the most commonly used in jungle operations. The designation or

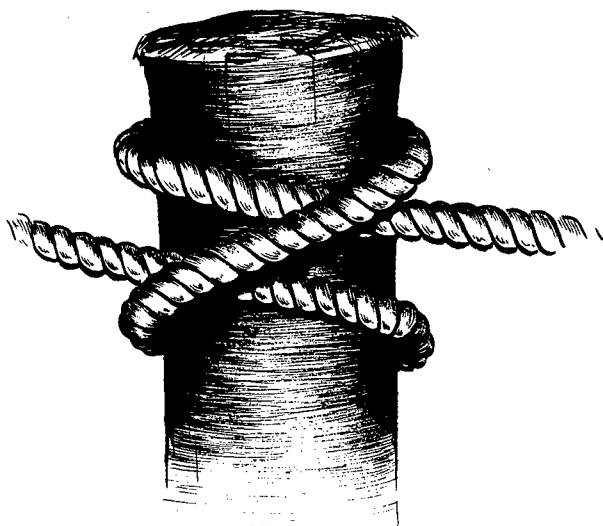


Figure 115. Clove hitch.

name of the different kinds of fiber rope will usually indicate the type of plant fiber from which they are made.

- (a) *Manila*. The manila rope is the most practical and usually the most available type of rope for use in the jungle. It is made from the fibers of plantain leaves, which are readily available in jungle areas of the world. The fiber varies in color from a yellow-white to a dark brown. The quality of the manila fiber varies with the color. The lighter shades are soft and clean and used in the best rope. The darker shades, used in poorer quality rope, are coarse and harsh. Manila rope made from lighter shades with long fibers is superior in elasticity, strength, and resistance to wear and deterioration. It is smooth and runs well over blocks and sheaves.
- (b) *Sisal*. Sisal rope is made from fibers of aloe leaves and is a hard fiber, similar to manila fiber in color. However, it is lighter and about 80 percent as strong. Sisal rope stands exposure to sea water very well and is used in many installations for this reason.
- (c) *Hemp*. Hemp rope is made from fibers of the hemp plant and has short, soft fibers. However, it is a strong, rather tough rope. Untarred hemp is the

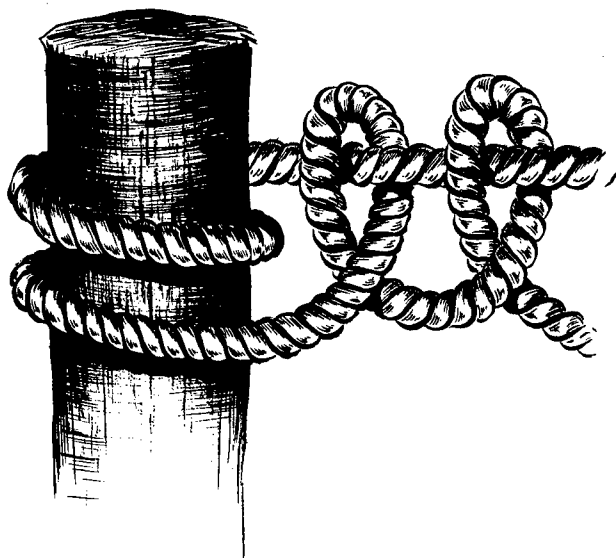


Figure 116. Round turn and two half hitches.

strongest fiber rope made. It is usually soaked in tar to preserve the rope from deterioration caused by dampness. The tar tends to reduce its strength and flexibility. Tarred hemp is known as "marline" and is a standard item of issue. Hemp rope coated with tar is not practical for use by infantry troops in moving situations because of weight.

- (d) *Coir*. Coir rope is another rope readily available in jungle areas as it is made from the fibers of coconut husks. It is a very elastic, rough rope about $\frac{1}{4}$ the strength of hemp and is light enough to float on water.
- (e) *Cotton Rope*. This rope is very smooth and is usually white in color. However, for use in the jungle, it should be treated with a preservative as it tends to deteriorate rapidly. Cotton rope is best utilized for small lashings such as in construction of brush rafts or float expedients.

d. Rope Sizes and Strengths. Military designation of rope size is usually expressed in terms of inches of diameter; in commercial fiber, rope sizes are sometimes designated by inches of circumference. For this reason, most reference tables concerning rope describe them both in terms of inches of

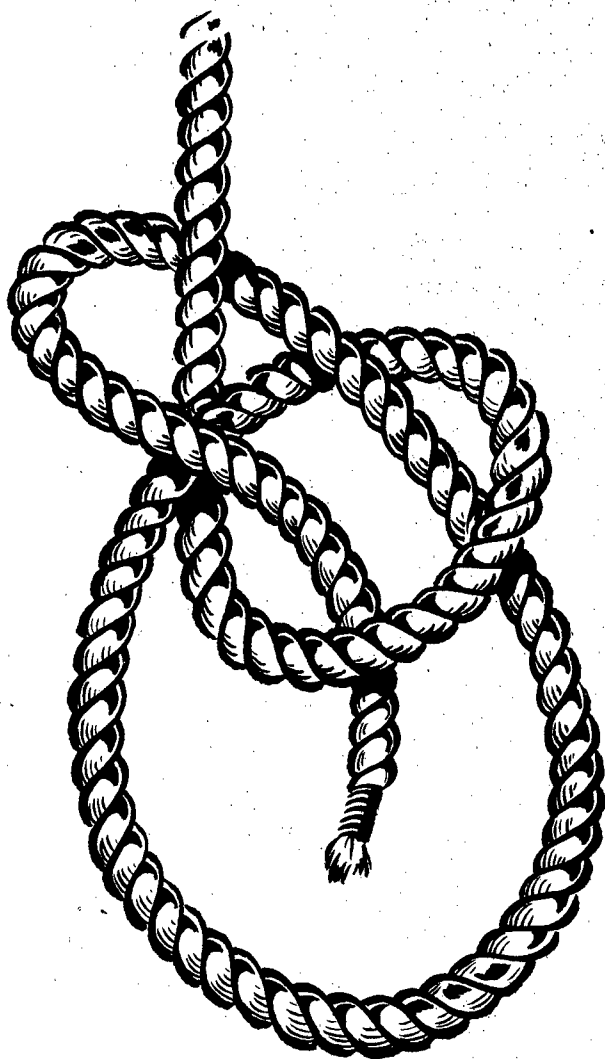


Figure 117. Bowline. To form a loop that will not jam or slip.

diameter and circumference. The strength of rope will vary considerably according to the load, type, and condition of the rope. The breaking strength of a rope will always be found to be considerably greater than the safe working capacity. The ratio is called the "factor of safety". Individual ropes and circumstances of their use cause considerable variation in the minimum breaking strength. Under no circumstances should rope be loaded to more than twice its rated safe working capacity. Even though the rope may not break under the load, the fibers stretch beyond the elastic limit and reduce the strength of the rope for future use. Exposure, wear, use and bending have a cumulative effect in

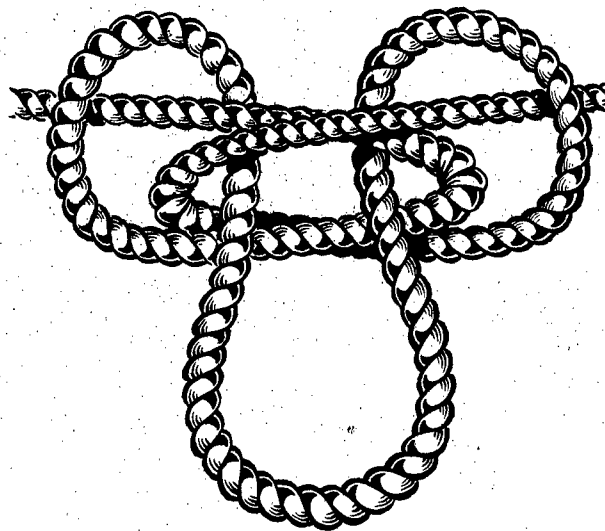


Figure 118. Butterfly. To take up slack in a rope.

decreasing the strength of the rope and an allowance should be made for this in estimating the strength of used rope. A rope slung over a hook or containing a knot is reduced in strength by approximately 30 percent. Sharp bends over corners reduce the strength approximately 50 percent. Exposure to heat or boiling water will decrease rope strength approximately 20 percent. Sand or grit between fibers of rope will rapidly cut the fibers, sharply reducing the strength. The breaking strength and safe load capacity for the two most useful sizes of ropes usually employed by jungle troops are: 1-inch diameter manila rope—breaking strength, 9,000 pounds; safe load capacity, 2,250 pounds; and 1/2-inch diameter manila rope—breaking strength, 3,650 pounds; safe load capacity, 660 pounds.

e. Breakage of Fibers. The strength of fiber rope decreases rapidly with use because of breaking or slipping of the fibers. The fibers will slip a small amount under each strain in spite of the twisting, and no attempt should be made to load a rope to its maximum after it has been used for some time. Breakage of fibers should be avoided as much as possible. Factors to consider:

- (1) Clean muddy ropes by washing in water.
- (2) Avoid pulling rope over sharp edges. Place a board or layers of heavy cloth between the rope and sharp edge to reduce breakage of the strands.
- (3) Sand has an abrasive action on the inner fibers of rope. Avoid dragging rope through sand or dirt.

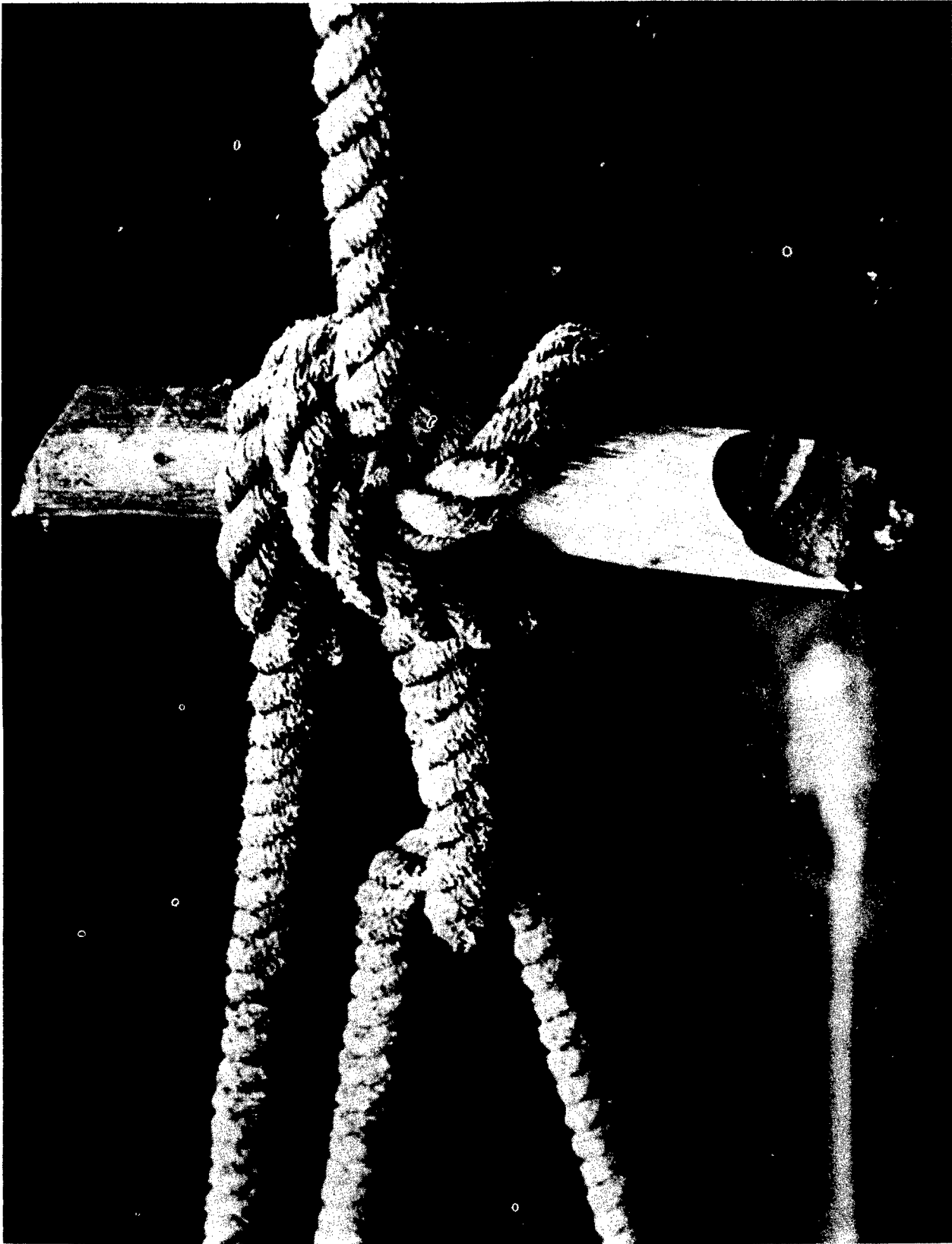


Figure 119. Stick placed in butterfly knot to facilitate untying.

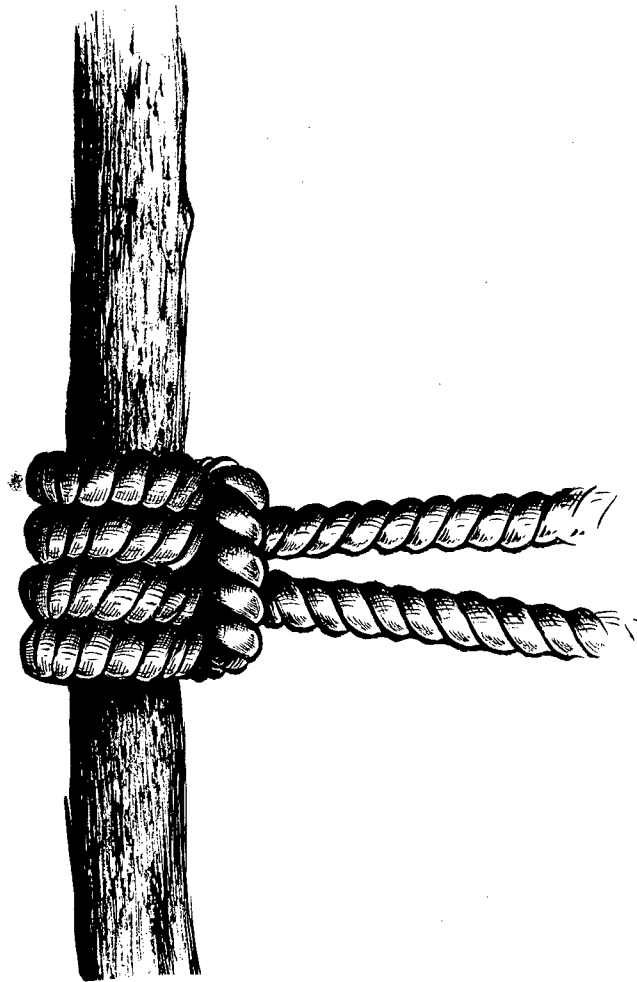


Figure 120. Prussik knot.

- (4) Whenever possible, use knots that can be untied easily to eliminate the necessity for cutting the rope.
- (5) Repair broken strands in rope as soon as possible.

f. Inspection of New Rope. The outside appearance of fiber rope is not always a good indication of its internal condition. The rope will soften with use and deteriorate according to the manner in which it is handled. Dampness, the amount of strain to which a rope has been subjected, the fraying and breaking of strands, and chafing on rough edges all tend to weaken a rope considerably. *Rope should be inspected carefully at regular intervals to determine its exact condition.* Since the surface appearance of a rope is not a good indication of its condition, the strands should be untwisted slightly to open the rope so that the inside can be examined. Mildewed rope will have a musty odor and inner

fibers of the strands will have a dark, stained appearance. Broken strands or broken yarns are ordinarily easy to find. The presence of dirt and sawdust-like material inside the rope are indications of damage. Since any weak point in a rope weakens the entire rope, it should be examined at a number of places. If the rope appears to be satisfactory in all other respects, pull out a couple of fibers and try to break them. Sound fibers should offer considerable resistance to breakage. When any unsatisfactory conditions are found, the rope should be destroyed or cut up in short pieces. This is to prevent the use of the rope for hoisting. The short pieces can be used for miscellaneous purposes such as toggle ropes but none of them should be left long enough to permit other use.

g. Knots. There are many knots and combinations of knots that can be tied in a single rope or that can be tied to join two or more ropes together.

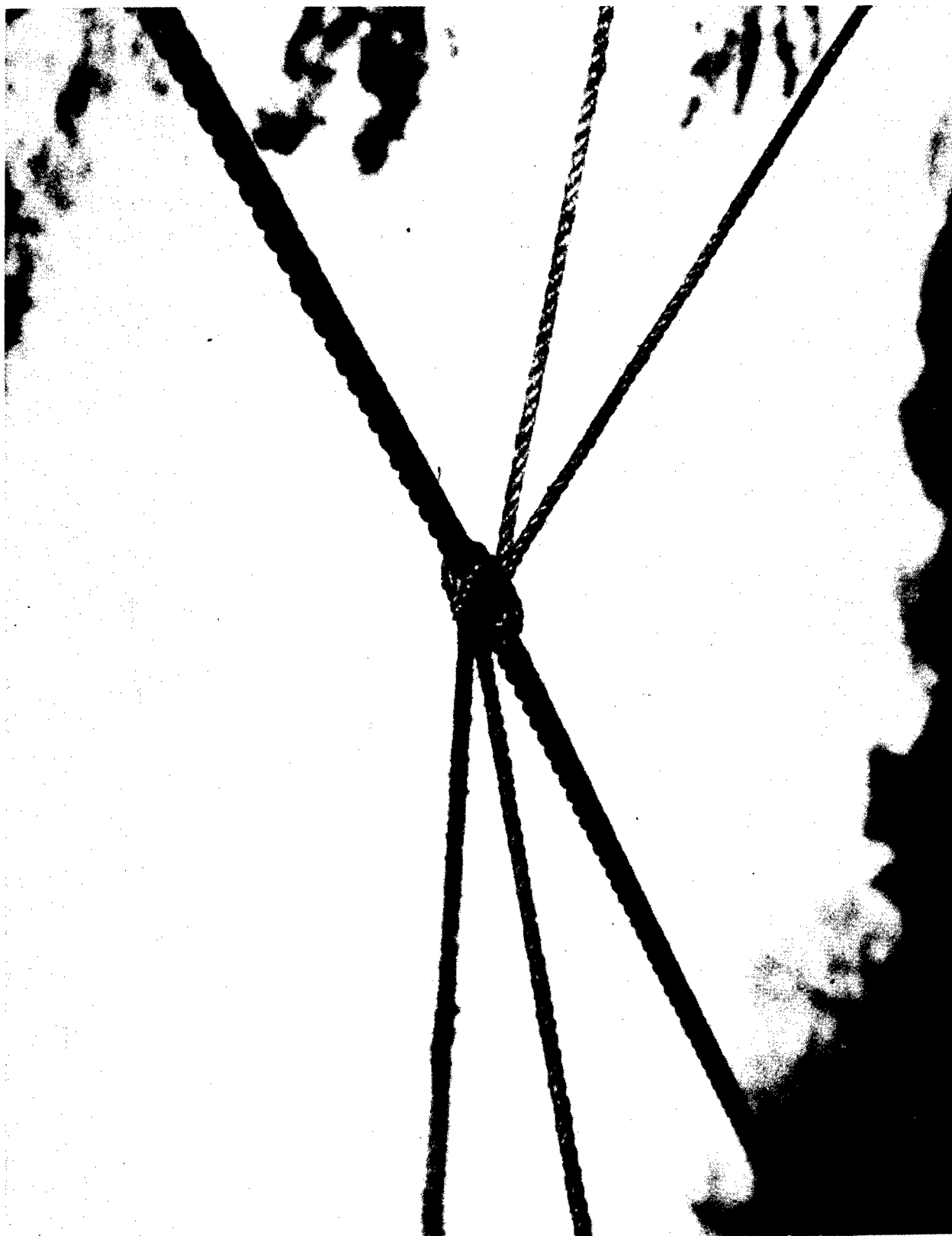


Figure 121. Prussik knots affixed to 1-inch manila suspension traverse line to brake speed of descent of a load carried by snatch block and sling.

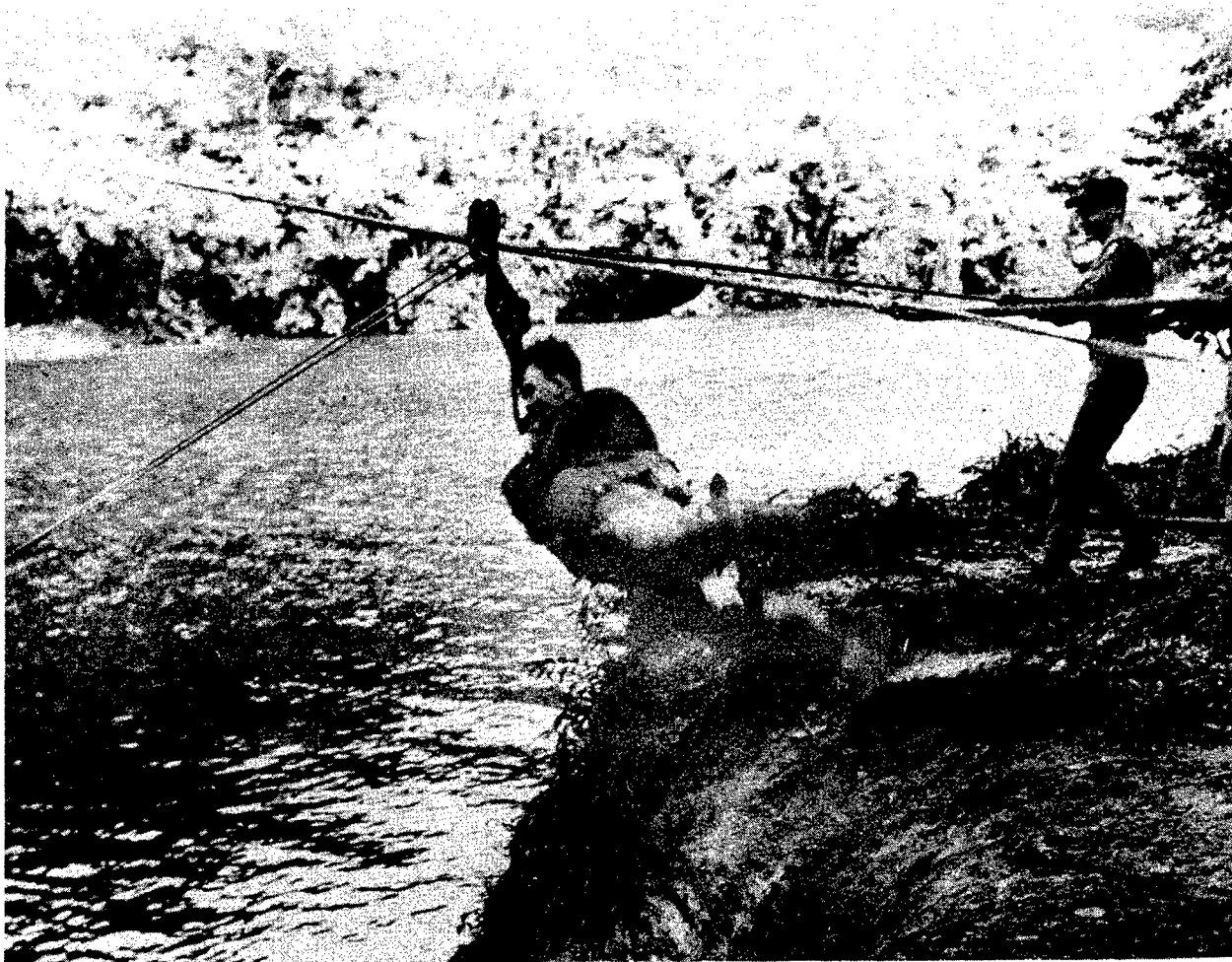


Figure 122. Prussik knot braking descent of soldier on suspension traverse. Notice that the snatch block has completely stopped and that the camera has caught the man's hat in midair. The blur caused by the sudden movement of the man's feet gives an indication of his speed when his block hit the knot. The jolt of this sudden stop is softened by the cushion effect of the suspended traverse line.

There are also many combinations of knots that can be used to fasten a rope to an object or to lash several objects together. Only the more practical and useful knots will be discussed here as FM 21-50, FM 31-72, TM 5-275 and TM 5-279 describe the many different kinds of knots and their use in detail.

(1) *Definitions.*

(a) *Ends.* Each rope has two ends. The "working" end or "running" end is the part of the rope that is utilized to tie a knot. The balance of the rope plus the opposite end is called the "standing" end or part.

(b) *Bight.* This is a simple bend or U-shaped interruption in a rope in which a part

of the rope is not placed across another part of the same rope.

(c) *Loop.* A loop is a simple bend or interruption in a rope in which the rope crosses itself.

(d) *Hitch.* A hitch is a loop placed in a rope to fasten to an object.

(2) *End of rope knots* (figs 113 and 114). This category of knots includes the "square knot", "sheetbend", and "double sheetbend". These knots are used for joining ends of rope together, the square knot for joining ends of rope of equal diameter and the sheetbend knots for joining wet ropes or ropes of unequal diameter.



Figure 123. Uncamouflaged soldier in position for sniping (upper right of picture). Several men similarly emplaced in trees could ambush a troop column on the ground with small arms and grenades. Troops must observe ABOVE as well as to the front, rear and flanks when moving in jungle.



Figure 124. Fire team deploying during encounter drill. Notice the difficulties caused by the dense vegetation. Control of fire team leaders, movement of troops and maintenance of straight skirmish lines are adversely affected by the jungle growth.

Working in wet jungle, troops will find the sheetbend knots to be very useful.

- (3) *Anchor knots* (figs 115 and 116). Ties of this category include the "clove" hitch and the "round turn and two half hitch" knots. These knots are used to tie the end of a rope which is supporting heavy weight or which is under constant tension. They are easy to tie and untie and facilitate fastening of rope bridges to jungle trees which are large in diameter.
- (4) *Bowline* (fig 117). This knot is used to form a loop in a rope that will not jam or slip. It is very easily untied. This is a most practical knot for the individual soldier as it can be used on the same rope many times without causing the rope to

be cut due to difficulty in releasing the knot, as is the case with many other knots.

- (5) *Square knot*. The square knot is quickly and easily tied and will not slip, but as it tightens under pressure, it is most difficult to untie. It is used to join ends of ropes of equal diameter.
- (6) *Butterfly* (fig 118). This knot is used to take up slack in a rope. As neither end of the rope is used to tie this knot it is often called a "middle-of-the-rope" knot. After tying a butterfly knot on a rope bridge, or for any other purpose where a great amount of strain or tension is applied to the rope, it becomes almost impossible to untie the knot. By inserting a piece of wood or pipe through the two loops or



Figure 125. View from ground level down jungle trail. It is obvious that observation would be better from the prone or squatting position as vegetation tends to interwine above the ground rather than on it.

wings (fig 119) of the knot, it can be quite easily untied after removing the stick or pipe.

- (7) *Prussik knot* (fig. 120). The primary use of the Prussik knot is to tighten a fixed line. It has many other purposes, one of these being to serve as a brake on a rope traverse line (fig 121). This is done simply by tying the Prussik knot around the traverse line and applying pressure by pulling on the ends of rope as the equipment or personnel cross the traverse rope and descend to the end of the rope. The same effect is produced by applying the brakes of a car. Figure 122 illustrates the employment of a Prussik knot to arrest the descending speed of a soldier crossing a wide river by means of the suspension traverse line, a sling, and block and tackle.

35. Conditioned Reactions (Firing Exercises)

a. Certain aspects of jungle terrain are definite limitations for the individual soldier. The way to minimize these undesirable aspects is to train to fire and hit ground and aerial targets that are fleetingly seen or vaguely defined. Well-controlled and effectively delivered firepower is the means to success in jungle combat. Because the range of assault or fighting is reduced, troops must be able to react to unexpected developments rapidly and accurately. Preliminary to success in jungle shooting is the ability of the soldier to shoot from the standing or squatting position. Speed and accuracy in shooting from awkward or "off balance" positions are absolutely essential. Commanders should first develop the natural reactions of troops to a point where immediate response to any situation is automatic. Once this is done, training exercises conducted under realistic conditions should require troops to



Figure 126. Soldier carrying complete three-man pneumatic raft.

fire and hit targets by reflexive reaction. This is best begun by a firing exercise utilizing blank ammunition in which rapid response, to sudden situations, is the main teaching vehicle.

b. Good Instruction and Practice. The constant need for practical firing exercises by troops training for jungle combat cannot be overemphasized. These exercises should be done at every available opportunity on whatever ranges are available. Ingenuity and imagination on the part of commanders and instructors can provide ranges for some form of live fire practice, whether shooting at bottles, cans floating down a stream, or other improvised targets, or at towed or radio-controlled aerial targets.

36. Reaction (Blank Firing) Exercises

Instructors should insure that these training activities require application of individual efforts and skills as well as unit participation. The objective of these exercises should be to impress upon the soldier that personnel targets are rarely visible except at extremely close ranges (50 meters or less), that targets are most often detected by movement, smoke, noise or flash and must be taken under fire immediately and accurately and that the danger of ambush in the jungle is ever present (fig 123). Equal emphasis should be placed on small unit (squad) reactions to situations requiring siting and execution of a hasty and deliberate ambush, battle drill for deployment upon unexpected encounters with enemy troops and execution of plans for counterambush measures. To stimulate maximum troop interest and to give commanders an accurate appraisal of individual and squad proficiencies it is recommended that checklists be used and exercises graded.

a. Deliberate Ambush Drill. The emphasis in this training exercise should be placed on correct siting of the ambush, use of natural materials for camouflage, emplacement of weapons, control of fires, and the withdrawal. The compatibility of jungle terrain and the ambush tactic make it essential that troops appreciate and understand the importance and potential of this form of combat. All squads, therefore, should receive drill not only in ambush execution but in counterambush actions as well. A disadvantage, or at least a limitation, of a blank firing exercise giving drill in deliberate ambush is the inability of all concerned to determine the effectiveness of the fire. This can only be determined by use of live ammunition and targets. If

possible, live fire exercises should complement the blank firing ambush drills.

b. Contact (Immediate Action) Drills. A unit moving through jungle terrain will most likely encounter the enemy by surprise at short ranges. At this point there is insufficient time for the unit leader to make an estimate of the situation, follow troop leading procedures and issue necessary orders to take immediate action against the enemy. In order to prevent such an occurrence, it is necessary for the unit to be capable of action in whole or in part without an order being issued. This can be accomplished with contact drills. Each man in the unit must be proficient in the techniques used in contact drills. In order to become proficient in the drills the unit must rehearse them repeatedly so that the reactions to various situations becomes spontaneous. Three squad-drills for this training are:

- (1) *The encounter* (fig 124). Often a unit will run headlong into an enemy force at point-blank range. This engagement may be called an encounter. If the unit encounters the enemy at close range and the point or scout sees that it is not possible to set an immediate ambush, he must take immediate action to enable the rest of the unit to take the initiative and follow the orders of the unit leader. To accomplish this, the point man signals or shouts "contact forward" (the signal could be the point man opening fire) and takes cover and engages the enemy. The automatic weapons, in absence of any orders to the contrary, move to a firing position and engage the enemy. The riflemen cover the flank and rear, awaiting orders from the unit leader. They must not become pinned down by enemy fires. The unit leader will then move forward and make a hasty estimate of the situation. This drill fixes the enemy and gives the unit leader time to make plans and issue orders prior to using fire and maneuver to destroy the enemy.
- (2) *Hasty (immediate) ambush.* The hasty ambush is the product of an ideal combat situation in which the point man, not having been seen himself, sees the enemy approaching. This situation provides an excellent opportunity for an immediate

ambush which can be set quickly, quietly, and without confusion by the use of the following drill. The *point* decides that an immediate ambush is possible, gives the appropriate signal and steps off in the direction the ambush is to be set. On receiving the signal, the other members of the point must immediately take cover and remain still even if they have not taken up a good firing position. The remainder of the unit will have more time to choose good positions, conceal themselves and site automatic weapons. The last man in the unit springs the ambush thus allowing the greatest number of the enemy possible to enter the killing zone. If the ambush is discovered before the last man opens fire, any member of the unit may start the action. The point moves into position after the firing starts and acts as a cutoff to seal the enemy's retreat route to the rear. There must be a pre-arranged signal to cease fire. The unit will, in most cases, have little idea of the strength of the enemy they are ambushing. Therefore, on the signal to cease fire, all troops must be ready to act quickly on order should the situation require immediate evacuation of the area.

- (3) *Counterambush.* When a unit is caught in an ambush the following drill should be executed. Those men caught in the actual ambush will return fire and will yell "ambush left" or "ambush right". They will be the base element and set up a base of fire for the maneuvering element. Those men not caught in the ambush will form a skirmish line and attack the flank of the enemy ambush position immediately. This must be done without hesitation and without any orders from the unit leader. Where the whole unit is caught in the ambush, fire is returned immediately to create weak points in the enemy positions. Troops should then aggressively exploit these weak points by immediate assault. This action must take place regardless of casualties incurred to prevent complete annihilation. (See paragraphs 41 and 42 for detailed information on ambush and counterambush techniques.)

d. Field Signals and Control Measures. The drill exercises described above require an effective system of arm and hand signals.

37. Live Fire Exercises and Weapons Training

a. Fire Distribution and Effects. This firing exercise should continue and complement the drill of the blank firing exercises. In addition to the problems of visibility caused by dense jungle vegetation, the soldier must become familiar with other problems. Natural concealment made possible by the thick growth requires that the soldier develop an almost supersensory skill at detecting targets. Lastly, the soldier must learn that it will not always be possible to detect a target's exact location. He must realize that the requirement of hitting such an unseen target is intensified and made even more necessary by the close range of combat. The intent of this exercise should be, therefore, to illustrate to the soldier the close range of assault, restrictions on target detection, necessity for rapid and accurate individual reactions, destruction of unseen targets by intense, well distributed shoulder fire and destruction of covered and protected targets by controlled fires.

- (1) *Review of basic considerations.* This exercise is conducted with service ammunition under conditions which should closely approximate that of an actual situation. A review of the following considerations should be given to troops prior to participation.

(a) *Characteristics of jungle encounters.*

1. Because of the inherent nature of the jungle, observation is severely limited. Cover and concealment opportunities accrue to both antagonists. Consequently, encounters are most likely to take place unexpectedly as to time and place and one, perhaps both, of the opposing forces will be surprised. This condition demands advanced individual training, alertness, and rigid self-discipline on the part of the soldier.
2. Combat will usually be at extremely close ranges, well under 50 yards. Thus, the soldier must react almost automatically to unexpected developments; this adjustment must be rapid, and it must be accurate. Rapid and accurate firing

reaction may overcome initial enemy advantages.

3. Actions in jungle combat are characterized by surprise and maximum firepower action or reaction. There is also the difficulty of locating the direction of the attack and it is often impossible to determine the size of the attacking force. The only means to combat such a situation is offensive action—attack! The force which attacks gains or retains the initiative, and by retention of this element of combat the very violence of the action itself can be turned against the enemy.
4. The ambush tactic and jungle terrain are complementary. Complete *destruction* of a force by ambush is quite possible. A force which is ambushed must spontaneously, in accord with rehearsed plans, assault the ambush positions by fire and maneuver. A retrograde movement in lieu of an assault will most likely result in severe damage to the ambushed element.
5. Control is extremely difficult. There are many means through which control can be exerted.
 - (b) *Voice control.* Voice commands are normally the best if the noise level and security of the action permit. Mechanically produced sounds are effective but are subject to the same limitations. Pyrotechnics are very limited due to poor visibility. Hand and arm signals are very useful when executed properly and when the terrain allows visual perception. It is essential that every unit member understand them. There is, however, no substitute for direct physical contact by a leader with his subordinates to control his force. This requires initiative, self-reliance, professional skill, and dynamic leadership.
 - (c) *Arm and hand signals.* For detailed information on these signals, see FM 21-60.
- (2) *Target detection in the jungle.* Personnel targets are rarely visible in the jungle except at extremely close range. Most combat targets will consist of men, irre-

gularly spaced, using concealment of the vegetation and cover of ground folds, rocks, large trees, and hardwood roots. Inasmuch as this type target is hard to detect, you must also watch for the flash and smoke of weapons and try to locate targets by sound. Targets detected by any means usually will be seen only for a few moments and must be taken under fire and attack immediately. The soldier must, at the same time, realize the nature of a target, the terrain and the prepared positions often used may preclude the use of the prone position. Jungle conditions do, however, favor the supported positions such as the foxhole standing and squatting positions. There will be times that the standing position is best. The soldier must be made to understand that targets which cannot be detected and/or seen can be attacked and destroyed. A means to realize this absolute necessity is a technique of fire that is called "fire distribution".

- (3) *Technique of fire.* "Fire distribution" is a term which simply describes the placement of fires against the enemy in such a manner as to most effectively engage the target. Fires may be distributed on a target of width, or depth, or both.
 - (a) To cover a target of width, the squad leader designates the center and flanks of a wide target. This can be done at the scene of action, or designation can be made prior to action by the "clock system". Repeated rehearsals are necessary to insure effective and correct comprehension by all squad members. The squad leader usually assigns each fire team half of the target, but the terrain may dictate that one team cover a larger portion than the other. The normal deployment from the squad's combat formation places the "Alfa" team on the right and the "Bravo" team on the left. Each automatic weapon firer covers the entire width of his team's target, making sure to overlap its flank. Each rifleman covers his team's target in the following manner. Initially, the left flank rifleman covers the left portion, the center rifleman covers the center portion,

and the right flank rifleman covers the right portion. After covering all known or suspected enemy locations in his own portion of the team's target, the rifleman fires at known or suspected enemy locations throughout the team's target. When the team leader fires he covers his entire team target. He must frequently check with the squad leader for signals and instructions, and is responsible for adjusting his team's fire, or shifting it, if necessary, to any portion of the squad's target. The squad grenadiers fire on assigned portions of the target and in addition, are responsible for engaging targets of opportunity. Also, they may be used by the squad leader for specific firing missions. If the squad leader gives them separate missions while the squad is engaging a wide target, the Bravo team leader covers the grenadier's portion of the target or shifts the fire of his riflemen to cover it.

- (b) To cover a target of depth the squad leader designates the center, front, and rear of the target. He may assign one fire team to cover the front half and the other fire team the rear half, basing the assignment, usually, on the terrain and the location of the target. Attack by fire alone seldom produces the desired, or at least significant, results. Designated elements of the force must assault the enemy, i.e., physically close with the hostile position and destroy it in close combat. For a description of assault fire, see FM 7-15.
- (4) *Maneuver in the jungle.* The initial consideration in a maneuver tactic is that the plan must be simple and that the maneuver element must not mask the fires of the support element. Control is difficult in the jungle and requires leadership and alertness of all squad members. Support fires must saturate the hostile force even if targets cannot be discerned or seen. *It must be remembered that proper fire distribution by the squad and the penetration capability of the service rifle and ammunition will enable destruction of targets afforded protection by jungle vegetation.*

By utilizing a maneuver element the enemy is forced to defend in two directions, thus splitting his control and his fires. The support can inflict casualties upon the enemy prior to the assault, and, most important, enable the maneuver element to close with the enemy. In the jungle, only close combat provides for complete destruction of the enemy. Immediate consolidation and reorganization must be effected at conclusion of the assault. Any element must expect an immediate counterattack and prepare accordingly.

b. *Quick Fire (Jungle Firing Lane) Exercise.* The purpose of this live fire exercise is to practice quick and accurate shooting at targets representing enemy soldiers while the firers themselves are on the move down a jungle trail. If units are conducting training in terrain other than the jungle, a trail should be cut through the most dense and concentrated growths that can be found and which meet local safety requirements. Targets should be mobile, i.e., as the firer moves down the trail targets should be presented to him from unexpected directions and at close ranges. The targets should be partly concealed when they are presented to the firer. If the moving or "pop" targets are hand controlled, an instructor following behind the firer must operate the wire or signal for presentation of the target at the right moment. The advantage of using moving targets is that they can be made to appear for a definite timed exposure. If stationary targets are used, they should be placed so that as the firer walks around a bend or comes to a certain point the target comes into his vision to the front or flank. The advantage offered by fixed targets is that the firer is required to pick out a silent and stationary target. They are a better test of powers of concentration and observation than the pull-type target. Each soldier's proficiency and progress should be scored and assessed.

c. *Shotgun Familiarization.* The shotgun as a weapon of close combat has proven itself under the most varied conditions. It has been used in trench warfare and in jungle combat. Its potential for jungle use is high because of the close-in fighting which dominates jungle operations. Troops should receive training on the shotgun that will familiarize them with all important aspects of this weapon. A

detailed discussion of this weapon follows in addition to information relative to range firing of the weapon.

(1) *Pertinent definitions.*

(a) "Shell" is the standard nomenclature denoting the shotgun cartridge. All components necessary to constitute the round are contained in a heavy brass and paper, brass and plastic, or all brass receptacle ("shell"). The preferred terminology is "shot shell" and not "shotgun shell".

(b) "Choke" refers to boring of the barrel, which varies in degree from full cylinder to full choke. The bore of a shotgun barrel has two diameters: the chamber diameter, and the true bore diameter. The chamber diameter is greater than the true bore diameter, and these two diameters are joined by the tapered section usually termed the "forcing cone". Choking is usually accomplished by boring the barrel so that the diameter of the bore near the muzzle end is slightly less than that of the true bore. The degree of choke in a barrel is measured by the dispersion of the pellets contained in the shot charge at a given distance from the muzzle. This dispersion is measured by the percentage of the number of shot pellets contained in the charge which will be contained within a 30-inch circle at 40 yards distance from the muzzle. Choke borings yield these percentages:

1. Full Cylinder 40%
2. Improved Cylinder 50%
3. Modified Choke 69%
4. Full Choke 75%

(c) "Gage" (gauge) is a scale originally developed as the number of lead balls of bore diameter to equal one pound. Thus, a 12 gage shotgun has a bore the diameter of which is such that it would take 12 lead balls of equal diameter to total one pound. A partial list of gage sizes:

1. 10 ga710 in
2. 12 ga645 in
3. 16 ga.610 in
4. 20 ga545 in

(d) "Buckshot" loads are powerful cartridges loaded with heavy, large diam-

eter lead pellets. Originally developed for deer (buck) hunting, the load is now used for combat and guard missions. Different sizes are:

Designation	No. pellets
1. 00 Buck	9
2. 0 Buck	12
3. 1 Buck	16
4. 4 Buck	27

(2) *Characteristics and advantages.* The shotgun weighs, in the riot/combat version, about 6.5 pounds and is shorter than the service rifle. This short length makes it easier to use in dense jungle. The simple and rugged mechanism, constituted of only seven major parts or parts groups, simplifies maintenance and repair and reduces the chance of malfunction in tropical environment. An outstanding attribute inherent in the shotgun is its flexibility, because the ammunition is available in various loads. The user can exercise a choice in selection of a load to suit the nature of the target. Because the shotgun is a multiple projectile weapon, rapid engagement of targets is possible.

(3) *Disadvantages.* In tropical areas, shotgun ammunition constitutes the primary limitation. It is bulky and heavy and increases the resupply problem in jungle operations. Because of the construction of the round, shot shell ammunition is susceptible to rapid deterioration, especially by moisture. The shotgun has a limited effective range. The maximum effective range is 100 yards or less. Shot shells do not allow deep penetration and this limits selection of targets. Because of the size and bulk of the ammunition, even repeating shotguns have limited magazine capacity. Six rounds (five in magazine and one in chamber) are usually the limit. Single round loading necessary to charge the magazine is an undesirable factor.

(4) *Shotgun types.* It is necessary to be familiar with the different forms of the weapon for two reasons. First, the U.S. Army has not developed its own guns for guard duty and special combat purposes, but rather has purchased civilian types from manufacturers. These guns, with

slight modification, suffice for military needs. The types used by the U.S. Army are the slide action and semiautomatic arms. Thus, familiarity with at least two types is necessary. Because it is a common weapon for hunting, many civilians own them and are a potential source of weapons in any guerrilla action. Because shotguns are procured from many independent sources, there is little uniformity of nomenclature. Many of the guns have similar types of mechanisms but corresponding components may have widely differing names, often conflicting with other established uses of the words. Therefore, a need for study and training relative to this subject obviously exists. The primary types of shotgun in use today are:

- (a) Single-barrel.
 - (b) Double-barrel.
 - (c) Manually operated repeaters (slide action and bolt action).
 - (d) Auto-loading repeaters.
 - (e) Multi-barrel.
- (5) *Characteristics of shotgun by types.* A training program should be designed to familiarize troops with the various types of shotguns and the characteristics of each. This will enable the soldier not only to differentiate between the types but will enable him to determine and understand the best military application for each.
- (a) Single-barrel guns, as the name implies, have one barrel only and are thus capable of firing but one shot without reloading. Such guns may be of the hammer or hammerless (usually) design and are manually operated.
 - (b) Double-barrel guns have two barrels mounted either side-by-side or one under the other. In the latter case they are termed "over-and-under" guns. The side-by-side design, usually termed "double-barrel", may have hammers or be hammerless, while the "over-and-under" design is usually hammerless. Both design are capable of firing two shots without reloading.
 - (c) Repeating guns have a single barrel with a tubular magazine below it, and are capable of firing from 3 to 6 shots with-

out reloading. Such guns are manually operated by means of a sliding action which loads, cocks, and clears the gun when operated. This is the action design of the shotguns primarily used by the U.S. Army.

- (d) Auto-loading repeaters have a single barrel with a tubular magazine below it and are capable of firing from 3 to 5 shots without reloading. Such guns must be loaded manually for the first shot. When the gun is fired, the recoil operates the mechanism to clear, cock and load the gun from the magazine.
 - (e) Multi-barrel guns have three or more barrels. Usually they have two shotgun barrels mounted side-by-side with a rifle barrel below. Such guns are usually of the hammerless design and are manually operated.
- (6) *Nomenclature and functioning.* For a detailed discussion of nomenclature and functioning of the various shotgun types in current use, see TM 9-285 and TM 9-2117.
- (7) *Range and field firing.* After receiving the preliminary training as described above, troops should fire the shotgun either on a known distance range or on a jungle firing lane. See TM 8-55 for additional information concerning range layouts and target configurations.

38. Night Fighting

a. *General.* Night fighting in the jungle is extremely difficult but troops must be conditioned to the fact that it is not impossible. In primary jungle where there is a canopy, night brings complete darkness to the ground. This condition forces the soldier to develop his senses of smell, hearing, and touch to a high degree. Troops, as a consequence, should receive intensified night training conducted either in jungle terrain or in dense woods. The soldier should be made aware that thick vegetation and heavy rain tend to muffle sounds, slow movement, and increase the difficulties of maintaining contact within groups. All of these factors should be related to the problems normally associated with night operations in any type of terrain.

b. *Employment of the Senses.*

- (1) *Sight.* Troops should not expose their eyes to any light after they have adapted them

to the dark. The principles of night vision are especially important in the jungle. Due to the complete darkness, the soldier must be particularly alert to note any indications of light. Care must be taken, however, as some types of rotten wood are phosphorescent and give off light.

- (2) *Smell.* Wet, decaying vegetation has a characteristic odor. The soldier must learn to distinguish this smell and not permit it to cover other smells that may give indication of enemy troops who might be very close. Their perspiration may be permeated by odors peculiar to certain foods; for instance, fish, garlic, and curried rice give off very definite, characteristic odors. Troops must learn to be alert for these signs.
- (3) *Touch.* It may be necessary for troops to identify the enemy or one another by touch. Prearrangements may be made for this. For example, members of the same squad can be required to wear an item of equipment in a certain way or on a certain part of the body. When identifying a man in this manner the soldier should be prepared to strike a killing blow immediately if identification reveals an enemy soldier. The enemy's racial characteristics (i.e., custom of wearing beards or long hair, body build, etc.) and the nature of his clothing and equipment should be known. Knowledge of these items will enable the soldier to identify the enemy by touch under conditions of complete darkness and absolute silence. Of particular importance is the soldier's ability to operate, load, and maintain his weapon by touch.
- (4) *Hearing.* Generally, nightfall imposes a requirement for absolute silence by troops in tactical situations in the jungle. Sound is a primary means of target detection, especially at night. Troops will become aware that the jungle is never silent. Animal and bird calls, buzzing of insects, movement of the wind through the crowns of trees, and the dripping of water from trees are heard constantly. A sound that is characteristic of the jungle is the dull

thumping noise made by a falling tree or large limb. Jittery and edgy troops unaccustomed or unfamiliar with this sound can cause a fire fight among friendly forces at night or give away a unit's position to the enemy by firing at these noises. Troops must be taught to distinguish these noises and be required to learn the more common sounds associated with friendly troops and their equipment.

c. Voice Communications at Night. Just as we may be able to identify the enemy by sounds, he may be able to identify us. Troops must eliminate unnecessary noise when communicating by voice. A good way to talk at night is to cup the hand to the other man's ear and whisper or use a low voice for instructions. The rustle of leaves and natural noises will cover such low level conversations.

d. Night Movement and Maintaining Contact. During the night movement in the jungle is most successful when confined to established trails and stream beds. It must be remembered, however, that such trails and defiles are potential killing grounds for enemy ambushes. Groups using these routes must be prepared for immediate action. If it is not possible or feasible to use these routes, troops should be prepared to move crosscountry. This movement will be slow, arduous, and exhausting. Extensive night movement is not practical, especially for sizable units. The problems of control and maintaining contact will be difficult and will require thorough planning. Some suggestions to aid night movement are:

- (1) Have the lead party string communications wire or engineer tape and have each man follow the wire or tape, holding it in his hand. The trail man should pick it up as he advances to prevent leaving a trail for the enemy to follow.
- (2) Close up and hold onto the man in front.
- (3) Attach some luminous material to the back of each man. Compasses, luminous watch dials, phosphorescent wood, or luminous tape may be used. If luminous tape is available, one method is to sew the tape to the back of the collar or cap to help maintain control and the desired interval.

- (4) Have a set of simple, silent, but well rehearsed signals for the more common actions expected. This could be anything from covering the tape on the back of the cap two or three times, to tapping the man

next to the front or rear a specified number of times.

e. Night Fighting Techniques. For a detailed account and description of the techniques of night fighting, see FM 21-50 and FM 21-75.

Section II. UNITS

39. General

a. General. Contacts with enemy forces in the jungle will usually be sudden, violently fought encounters between small troop elements. Primarily, such actions will be fought by patrols where the essential requirements for success will be strong and effective junior leadership and high state of training of the individual soldier. High standards can only be achieved and maintained by a progressive program from individual through unit training.

b. Training Priorities.

- (1) *First priority.* Commanders should arrange training programs to require drill, practice, and rehearsals until proficiency of units is attained in the following subjects and skills:
 - (a) Patrolling.
 - (b) Ambush.
 - (c) Counterambush.
 - (d) Guerrilla and counterguerrilla operations.
 - (e) Jungle base operations.
- (2) *Second priority.* The following subjects are important and may be readily combined with first priority training activities. Maximum integration of the following subjects should be effected during all unit jungle training:
 - (a) Small boat handling techniques (to include improvised obstacle crossing expedients).
 - (b) Communications and communications expedients.
 - (c) Supply and evacuation techniques.
 - (d) Construction of trails, bridges and roads.
 - (e) Identification and engagement of aircraft.

40. Patrolling

a. General. Patrolling is important in all types of warfare; however, it has increased importance under jungle conditions, especially against guer-

rilla forces. Patrol techniques for the jungle are not basically different, but because of the terrain, vegetation and usual guerrilla jungle tactics, some modifications to normal technique and methods are advisable. The basic aspects of patrolling are covered in FM 21-75 and advanced training in this subject as well as a description of patrolling operations in FM 21-50.

b. Types and Missions. Patrols are classified as either reconnaissance or combat, the designation generally indicating the mission.

- (1) *Reconnaissance patrols.* These are small patrols which are sent out to seek information by stealth, avoiding contact with the enemy. A reconnaissance patrol in the jungle should not exceed 6 men due to the difficulty in moving silently through dense vegetation; a larger number of men is liable to cause noise which would increase chances of detection. Because of the usual scarcity of information about the terrain and the probable unfamiliarity of troops with the lay of the ground, these patrols should be detached from a combat patrol, if possible. The combat patrol will then have the advantage of some members who are familiar with the terrain in the immediate vicinity. This would be especially advantageous if the combat patrol is sent out over the same routes used by the reconnaissance element.
- (2) *Combat patrol.* These patrols may vary in size from a squad to a company. Generally, a combat patrol is dispatched to contact and eliminate an enemy force or installation. In jungle operations this type of patrol may be assigned specific missions to—
 - (a) Attack enemy patrol bases.
 - (b) Attack guerrilla base camps and/or destroy their cultivations.

- (c) Pursue a guerrilla force after attack by a larger unit or after a guerrilla raid or incident.
- (d) Ambush enemy elements.
- (e) Dominate or interdict an area to prevent guerrilla elements from contacting friendly civilian elements.
- (f) Search (or "sweep") specified areas.
- (3) *Common mission.* All patrols are a source of intelligence and must be prepared to report all information, topographical or enemy, which is discovered. Combat patrols are often a better source of information than a reconnaissance patrol because combat patrols contain more men who are able to observe, remember, and report enemy activities, terrain characteristics or other important and unusual occurrences. Further, a combat patrol usually is successful in finding and fighting the enemy. As a result, members are in a position to find out more about the enemy, his equipment, his morale, his fighting qualities, and his state of training, than are members of a patrol whose mission is merely to observe the enemy without contacting him. The mission of intelligence cannot be overemphasized in the jungle because of the difficulty in obtaining accurate information. In training, troops should be continually reminded that they represent the primary means to acquire such detailed information.

c. Influence of Jungle Terrain on Patrolling. Many conditions of the jungle affect patrolling actions. These influencing factors, which have been previously mentioned and described are vegetation, climate, weather, terrain, and animal life. This combination of factors and elements severely limit the range, speed, and extent of patrol actions.

- (1) *Advantages.* In spite of the general hostile nature of these factors some advantages are offered. The dense vegetation affords excellent concealment and some cover which tends to favor the patrolling unit. The dense vegetation and terrain obstacles will also hinder enemy movement and observation. Advantage can also be taken of the elements, such as rain which covers the sound of movement by its own noise,

or the dampness of ground and vegetation which also muffles noise of movement.

- (2) *Disadvantages.* Primary among disadvantages brought on by the influencing factors is the problem of control and movement. All movements by troop elements in the jungle must be considered tactical movements. The ease with which enemy elements can infiltrate deep into supposedly "friendly" areas, require that no relaxation into "administrative" conditions or situations be permitted once troops start a tactical exercise. This requires extensive control measures that must be effected by all leaders. Rate of movement in primary and secondary jungles is seldom more than one half mile or one kilometer each hour. Troops must be conditioned to this fact and must be trained not to overestimate the distance actually traveled. Occasionally there are small clearings where the overhead branches of trees are not thick. It is possible to receive air drops in these clearings provided adequate air-ground signals are available. Patrol leaders should attempt to accurately locate cleared areas on the map for later aerial resupply sites or medical evacuations. It would appear that because of the shade provided by trees, movement in the jungle could be made over reasonable distances without great physical discomfort from heat; however, the high humidity and the heat from the ground magnify the sensation of heat. The combination tends to exhaust troops quickly and lessens their normal powers of endurance. Owing to the restricted visibility in the jungle the only sure means to maintain direction is by compass. Every leader down to the most junior must be able to use the compass with confidence and accuracy. Movement through swamps is the most tiring and slowest of the conditions likely to be encountered.
- (3) *Minimizing the effects of the influencing factors.* Troops must be trained to pace themselves to the limitations imposed upon patrol actions by the jungle; they must be trained to feel at home in the environment and made to realize that the jungle provides good cover and concealment which

may enable them to close unobserved with the enemy and destroy them more easily.

d. Movement of Patrols in the Jungle.

(1) *Silence.* Silence, with respect to both voice and movement, is essential at all times. With practice it is possible for troops to move at a good speed in comparative silence. Each soldier should move steadily, deliberately, and carefully, parting the undergrowth rather than crashing through; attention should be given in training to correcting and eliminating the tendency of some to blunder forward. This mistake not only causes bruises, scratches, and loss of direction but is also very noisy. Troops must be taught not to walk on dry leaves, sticks, rotten wood, etc., wherever this is possible.

(2) *Cutting trail.* Troops should use their machetes to cut trail only as a last resort or to avoid excessive detours. There is nearly always a route or way nearby where movement will be easier. Cutting a trail has the following disadvantages:

- (a) It is not silent.
- (b) It reduces speed of movement.
- (c) Fatigue of soldiers in the leading element is increased.
- (d) Quick handling of weapons is prevented.
- (e) It leaves a well marked trail.

(3) *Trails and trail discipline.* Movements on trails should be avoided; however, it may sometimes be necessary when speed is essential or when moving in mountainous country. Not only should patrols avoid established trails but should make all possible effort to hide signs of movement to prevent leaving a trail themselves; this is extremely important when moving through virgin country. Some aids to practice in training are:

- (a) All troops should wear the same pattern sole on the combat boot.
- (b) The last man in a column should brush the path made by the other members with a small branch after the patrol has passed to smooth it out or make it look as natural as possible.
- (c) Troops must be required to observe trail discipline. They must NOT signpost the

route with litter and waste food; these should be buried carefully. Troops on patrol should be permitted to have only the barest essentials and the minimum of comfort items when operating. Leaders must be constantly alert to prevent men from plucking leaves or breaking twigs, especially at breaks.

- (d) When patrols move through close, hilly country, troops should avoid small saplings. The shaking of overhead branches can be seen and heard at a distance.
- (e) When moving through tree cultivations, patrol members must keep off trails, if only by walking a few feet off these trails.

(4) *Speed of movement.* The general restrictions on movement indicated by paragraph 10 of this manual apply in the instances of patrols. However, because patrols usually must operate according to a most stringent time schedule some discussion of this facet of operations is considered appropriate. Speed of movement is dictated by the nature of the country, the mission, and the schedule previously mentioned. Speed in moving from one location to another will be better obtained by intelligent route planning than by trying to push quickly and blindly forward. It is important to emphasize in training that speed will always be limited by the necessity to avoid noise in movement; also, movement must be expected to be painfully slow. Movement in the jungle is fatiguing, both physically and mentally, and a balance between the desire to move quickly must be maintained with the necessity of keeping troops fresh, strong, and alert for action once the objective is reached. Halts must be called for observation and listening and less frequently for rest. In training there should be no set routine for rest breaks. If these rest periods are allowed at regular intervals, troops may look forward and concentrate on the anticipated halts to the exclusion of all other considerations. Terrain difficulties will usually dictate when to take breaks. It must be emphasized in training that all members of a patrol must concentrate with all their senses to the

task at hand; the jungle is no place for allowing the mind to wander or to allow the soldier to be preoccupied with his own discomforts. When halted, troops must always take up positions providing for all around security. When marching in single file it may be necessary to delegate responsibility for protection and lookouts down to groups. As a guide, it is suggested that, when working out times for rest halts, the patrol leader consider the ground over which the unit is moving. In relatively easy terrain he should start with the usual ten minutes in the hour for rest breaks; under such conditions he should not march for longer periods as the men may resent this. However, when traversing difficult country halts must be more frequent; only a patrol leader who knows the physical condition of his men can determine how frequent these halts should be. After passing through a swamp or climbing a steep slope, it is a good plan to call a short break. It is important that the patrol leader ascertain that the entire patrol has passed through a defile, cleared a swamp, or ascended a steep slope to relatively level ground before ordering a halt. If this is not done, only the leading elements will be rested. Of more serious consequence will be the detrimental effect on morale; the men to the rear will have serious doubts about the patrol leader's concern for their welfare if they experience many "rest breaks" in swamps, steep slopes, ant-infested clearings; prickly saw-tooth grass patches, or other poor sites.

- (5) *Observation.* A soldier must notice every sign of movement around him, all marks or signs on the ground, and all instances of broken, cut or trampled vegetation. The sense of smell must be keen and free from cigarette smoke, the odor of candy, the smell of hair oil, shave lotion, or talcum so that the individual soldier will immediately notice any strange smells. All of these unnecessary items should be denied troops in training to illustrate the detrimental effects they can produce. Periodically, depending on how close the patrol leader suspects the enemy to be, the patrol

should stop and listen. At halts, every member of the patrol concentrates on listening and reports anything he hears. Troops must be trained to disregard the general pattern of foliage immediately surrounding them and to look "through" rather than "at" the vegetation. A better view is often obtained by looking through jungle at ground level (fig 125). If any unusual sign or sound is noted a patrol must "freeze" in place silently; there should be no other movement until the patrol leader has investigated the situation.

e. Control Measures. It is obvious that when confronted with the many problems presented by the jungle a patrol leader must concern himself with the means to control his force. Voice commands are of limited effectiveness and are a threat to secrecy; other audible signals suffer from the same disadvantages. The most effective control means available to a patrol leader are silent arm and hand signals. A number of these signals has been discussed previously. Any number or combination of signals to denote specific meanings may be developed within units. It must be remembered, however, that signals must be kept to a minimum commensurate with the needs of a patrol and that once a standard pattern is adopted it must be practiced in training situations or rehearsed until the entire code is understood by all members of a unit or a selected patrolling force.

(1) *Formations.*

(a) *Squad.* Generally, two types of formations for squad-sized patrols will suffice for movement in the jungle. These are the single file and open formations; these are similar to the "column" and V formations used in more open terrain.

(b) *Platoon.* The squads of a platoon will usually have to move in file or column formation in the jungle. At times the nature of the terrain may require a more open formation; in this case rifle squads may move, two or three forward, on parallel axes. The patrol leader must constantly analyze the ground and vary formations of the patrol to suit it.

(2) *Position of leaders.* Squad leaders should remain with and control their squads. This can usually be done from near the head of

the column; maximum use should be made of fire team leaders to maintain control and man-to-man contact with squad members. Leaders of platoon-sized or commanders of company-sized patrols will be located within their patrols according to the dictates of the ground, the tactical situation and the formation used. These positions should be sufficiently far forward to—

- (a) Allow the leader to influence the action from the start. Although it is not desirable for the leader to be caught in opening bursts of fire he should place himself where he can direct and quickly exploit immediate action drills.
- (b) Enable the leader to exercise and enforce control measures, control the point and navigation team, read the map, and order halts properly when deemed necessary.
- (3) *Guides.* The word “guide” is used here as denoting someone with an intimate knowledge of an area or anyone who can lead friendly forces to a known enemy location. These may be surrendered enemy personnel, captured enemy personnel, or natives. Information received from any of these sources should be carefully evaluated and used with reservation. It is unwise to completely depend upon all information offered by “friendly” natives or enemy personnel. If patrol leaders are not careful, there will be a tendency to allow guides to lead a patrol. This is most certainly wrong because —
 - (a) They are not trained scouts and are not part of the military team. Their function, if reliable, is merely to show direction.
 - (b) If enemy troops are encountered en route, guides may panic and prejudice the patrol's chances of accomplishing the mission.
 - (c) Patrol leaders must be ever wary of being led into an ambush by treacherous and seemingly well-meaning guides. The correct position of a guide, if used on a patrol, is with the patrol leader. The patrol leader will make decisions as to direction and tactics, using the guide's advice as he deems appropriate.

- (4) *Maintaining contact.* The patrol leader must always adapt his speed of movement to that of his rear elements; in other words, responsibility for keeping touch must be from front to rear. The flanks or flank security must maintain their position by the center of the column. The only exception to this rule will be the lead element whose whole attention must be focused forward.

41. Ambush

a. General. In no other type of military operation is the ambush more important, more effective or more frequently employed than in jungle combat. An ambush is a specialized form of combat in which the principles of concealment, surprise, and offensive action are used to inflict maximum casualties, confusion, and destruction to any enemy on the move. Since the ambush does not require the seizure and holding of ground, it is a favorite tactic of the guerrilla who will make every effort to infiltrate the jungle for purposes of ambush. The basic elements of ambush are covered in other publications such as FM 21-50, FM 21-75 and FM 31-16. However, because of their application in jungle operations a detailed discussion of this subject is included.

b. Role of the Individual Soldier in an Ambush. The individual soldier must be impressed with the fact that he alone is the key element in an ambush. In the jungle, his self-discipline and readiness will be a deciding factor in success or failure.

c. Ambush. Ambush may be defined as: “A trap sprung on a moving or temporarily halted enemy column and is based on concentrated surprise fire from concealed positions.” Special note should be taken of the words “trap” and “sprung” and the phrases “concentrated SURPRISE fire” and “concealed positions”. A trap is “sprung” because it moves suddenly, rapidly, and without warning. The fires of weapons are “concentrated” because the target area is small and the volume of delivered fire is of great intensity; these fires can be directed at a single point or small area because the delivery is made suddenly, violently, and without prior indication. “Concealed positions” prevent members of the ambush and their equipment from being seen by the enemy. This is the absolute requirement of ambush, for without concealment there is no surprise and without surprise there is no successful

ambush, and an unsuccessful ambush is frequently fatal to those who fail.

d. Purposes of Ambush. Generally, ambushes are executed to reduce the enemy's combat effectiveness by the physical damage caused and through the harassment involved.

(1) *Means to accomplish these purposes.*

- (a) Destruction is the primary purpose, because loss of men and equipment critically affects the enemy. He will have to divert troops from other missions to protect himself against ambush. The failure of reconnaissance and combat patrols to accomplish their missions because they were ambushed deprives the enemy of valuable contributions these patrols would make to his combat efforts.
- (b) The damage caused by the harassment of frequent ambushes is less apparent than physical damage, but is very important. When ambushes are frequent, troops tend to be reluctant to go on patrols, move in convoys, and move in small groups. They become less aggressive and more defensive minded; they avoid night operations, become more subject to confusion and panic if ambushed, and, in general, decline in effectiveness.
- (c) An ambush may be an ideal method to obtain intelligence. A successful ambush enables us to capture prisoners, documents, and pieces of ordnance, make identification of enemy units by observing insignia on dead or captured soldiers, give us indications of enemy combat proficiency level by their reactions to ambush and give us information on the status of combat equipage. The extent of the enemy's familiarity with the terrain may also be revealed by his actions.
- (d) Patrols operating deep in enemy areas may be able to partially or completely resupply themselves through ambushes set to seize supplies and equipment, thus increasing combat effectiveness at the expense of the enemy. In many instances, this is the primary source of supplies and materiel for guerrilla elements.

e. Characteristics of Ambush.

- (1) *Surprise.* The most important element of an ambush is surprise. If surprise is not achieved there is no ambush. It is the decisive factor which shifts the immediate control of the combat situation to the ambushing force. It consists of striking the enemy when, where and in a manner for which he is unprepared. If the enemy cannot be taken completely by surprise, he must become aware too late to react effectively. Surprise can be achieved by speed, secrecy, deception, by variation in means and methods and by using seemingly impossible terrain. Effective firepower must exploit surprise.
- (2) *Control.* Control is difficult to establish and maintain. Control is necessary during the movement to, occupation of, and withdrawal from the ambush site. The most crucial time of the ambush operation is the moment the enemy arrives at the site. Control measures must be provided for opening fire. The time the enemy's lead element arrives at a certain location may be designated as the time to open fire. In any event, opening fires must be in direct control of the ambush commander. Communications with security elements is essential and with higher headquarters is desirable. Exacting control must be exercised to insure that the ambushing force is alert and silent. Assembly and rallying points are designated to assist in control during withdrawal.
- (3) *Concentrated fires.* The short killing time demands highly concentrated fires which are achieved by careful planning and positioning of weapons. The fires of all weapons, including rifles, close-in automatic weapons, rocket launchers, grenade launchers, claymore mines, and other weapons are tied into the fire plan. The assignment of sectors of fire, and the location of friendly elements are considered. Plans are made for isolating the ambush area to prevent escape and reinforcement by the enemy. Effectiveness of the ambush depends upon the surprise delivery of a large volume of fire. Fire from at least two

directions and converging on the target is desirable; care must be exercised to prevent friendly troops from firing into other friendly positions of the ambush when converging fire is used.

- (4) *Simplicity.* Another essential characteristic of the ambush is simplicity. Simple plans and orders are easily understood and executed, particularly if the ambush is to be in position for a long period of time; lengthy detailed orders are not likely to be remembered exactly and consequently, are either not carried out or are misinterpreted. This may occur even after detailed rehearsals.
- (5) *Concentration of action.* Once sprung, an ambush must use all available firepower. To do this requires careful attention during training. Under excitement some men will shoot ineffectively, or fail to fire their weapons. In addition, due to the limited zone of fire, some of the enemy may escape the initial fire. This can be overcome by a determined assault against the enemy by all or part of the ambush patrol.
- (6) *Discipline.* The last characteristic is self-discipline. Remaining in a set ambush can be a boring and uncomfortable job. It may be necessary for the soldier to forego smoking; to endure in silence, insect bites, thirst, and the desire to ease cramped legs, or to perform normal body functions. Systematic and continuous training is necessary to develop the required patience and self-discipline.

f. Factors of the Successful Ambush. There are several considerations or factors that affect the constitution of a successful ambush. These factors are:

- (1) *Plan.* The plan for an ambush (deliberate) must provide for every conceivable course of action the enemy is capable of adopting and must be rehearsed in detail. Tentative plans must be made for ambushes of opportunity, adopting or modifying as appropriate, at the ambush site. The plan must provide for—
 - (a) Ease and completeness of expression by operations order.
 - (b) Deployment—ambush formations to be used.

(c) Organization and size of ambush.

(d) Type of ambush.

(e) Equipment to be taken.

(f) Actions to be taken.

(g) Routes to be followed.

(h) Formations on the march.

- 1. When developing the plan, it must be kept simple to eliminate confusion. If one man forgets what he is supposed to do, the entire ambush is endangered.
- 2. The next consideration is the equipment to be taken. Special equipment might be needed above that which the men of the patrol are normally equipped. Examples are: infrared equipment, mines, demolitions, sound-powered telephones, ropes and gags for prisoners, and extra machineguns or automatic rifles.
- 3. Routes are carefully selected. A good patrol leader avoids danger areas, such as roads, bridges, fords, known enemy locations, civilians, and villages. Generally, the patrol should not use the same route back as it used on its trip to the ambush site.
- 4. Another important element of the plan is the formation to be used. Only basic formations should be prescribed. One formation is the single flanking force which requires that the patrol be placed along the side of the area to be ambushed. The advantage of this formation is its ease of control, and the use of but one rallying point. Disadvantages lie in the fact that the enemy may escape from the ambush patrol and the lateral dispersion of a large force might be too great for effective coverage. Another formation is the single flanking force with a decoy. The decoy may be a piece of equipment or other item that will attract the attention of the enemy soldiers causing them to bunch up. When the enemy is gathered around the decoy, the patrol opens fire, killing as many of the enemy as possible in the opening volley. This formation has all the advantages of the single flanking force; however, there is the disadvantage that the attempt at

ruse may become apparent and alert the enemy. Another formation that may be prescribed within the plan is the L formation and its companion the V formation. In these formations, the patrol is split into two groups, one group is placed alongside the trail while the other group is perpendicular to the trail; in the V formation, the apex of the V meets at the trail and the patrol is disposed laterally along both sides of the trail, making sure that one group does not fire into the other. The advantages of these formations are that the enemy is caught in a cross-fire and fewer escape routes are available to him. Disadvantages are found in that control is difficult because the patrol is split, two routes of withdrawal and additional rally points are usually required and there are fewer sites that favor these formations.

5. The plan must provide for the organization and size of the ambush patrol. Determining factors here are the purpose of the ambush, the enemy force to be attacked and the personnel, weapons, and equipment available.
6. The general type of ambush must be determined and be stated in the plan. The deliberate ambush is executed when prior information of the targets permits detailed planning before the patrol departs for the ambush site. Likely targets would be: any enemy force, when prior information is known; enemy patrols operating on a pattern of times and routes; or carrying parties moving on patterned routes and time schedules. A hasty ambush would be used when available information does not allow detailed planning prior to departure of the patrol. There are several courses of action to govern conduct of such an ambush patrol. Immediate reconnoitering of a suitable ambush area could be made allowing execution against the first target of opportunity. Or, such a patrol could depart after dark, ambush the first target of opportunity and return before daylight. Such

a patrol can also ambush an enemy element in a situation in which contact cannot be avoided.

- (2) *Site.* When siting an ambush the terrain must be carefully analyzed. A careful study must be made using maps, aerial photographs, and when possible, a personal reconnaissance. The ground must enable occupation and/or preparation of concealed positions. All reconnaissance and movement into position must be from the rear of the selected ambush position. Covered routes of withdrawal should be available to enable the ambush to break contact and avoid pursuit by fire. Favorable fields (tunnels) of fire must be allowed the ambush. The site selected should impose canalization of the enemy force into the killing zone; the site should, of course, afford a position insuring contact with the enemy. The site must contribute to, or at least not detract from, the surprise of the ambush. Considering this, the ambush patrol leader does not have to select the best ground or terrain suited tactically for his ambush. Many times the selection of a site for surprise alone will be more advantageous than attempting to ambush an enemy from a spot of which he is sure to be suspicious. Therefore, the ambush might be laid downhill from the enemy as well as uphill. When downhill from the enemy, it becomes more difficult for him to escape since he will have to escape uphill. If the ambush is uphill from the enemy, it is easier for him to escape by running downhill. However, if advantage is taken of natural obstacles or mines, the uphill position should be the more successful of the two.
- (3) *Positions.* When the patrol reaches the site, the patrol leader first places his security force out to prevent being surprised while positioning his ambush force proper. The next elements to go into position are the automatic weapons. These positions are selected so they can allow fire along the entire killing zone. If this is not possible, these weapons are given overlapping sectors of fire, making sure the entire killing zone is covered by automatic

weapons fire. After the automatic weapons are positioned the patrol leader selects his position. He should be located at the point in the ambush where he can tell when the proper time comes to commence firing. After he has selected his position, he or his assistants place the riflemen in position. The riflemen are placed so they can cover any dead space left by the automatic weapons. Positioning of weapons should allow mutual support by assignment of sectors of fire.

- (4) *Camouflage.* Camouflage plays an important role in the ambush. The aim of the ambush is to kill the enemy by surprising him, and to do this each member of the ambush patrol must be hidden from the enemy's view. Before moving out each patrol member camouflages his person and his equipment; he also tightens his equipment to prevent rattles. After going into position he carefully conceals himself to prevent being seen. Lastly, there must be no unnecessary talking, smoking, or movement. If reliefs are to be used, they should be prearranged. Once the relief begins, only a few men should move at a time, because it is less likely that one or two men moving at once will be spotted, whereas if the entire relief moved at once, the chances of being seen would become much greater. In no other operation is camouflage discipline more important than in the ambush. Weapons should fire through screens of undisturbed, living foliage, and all spoilage resulting from preparation of positions should be removed.
- (5) *Signals.* An ambush patrol leader will need at least three signals for his ambush: a warning signal, a signal for execution, and a signal for withdrawal. The warning signal should be a silent signal. Examples of silent signals are hand and arm signals and vines or cords laid across the arms of selected members of the patrol. When the enemy comes into sight the sentry pulls on the vine causing it to move across the arm of the patrol leader. He in turn alerts the other members of the patrol. The sig-

nal for execution may be the exploding of mines, or it may be a shot fired by the ambush patrol leader or his assistant. Other signals are rapping or snapping sounds such as hitting the helmet with a stone, hitting two metal objects together, or the breaking of a stick. For the signal to withdraw, voice commands, whistles or pyrotechnics may be used. The signals should be changed frequently so as not to compromise them.

- (6) *Fire discipline.* A key part of the ambush, in effective execution, is fire discipline. The timing and delivery of fires must contribute not only to surprise but to the actual destruction of the enemy. This requires control, and the patrol leader exercises this control by assigning sectors of fire and by commands.
- (7) *Withdrawal.* Before the withdrawal begins, several actions might have taken place. First, the patrol was successful and destroyed the enemy forces, or accomplished its assigned mission thereby eliminating any immediate danger to itself. In that case the patrol leader would move his patrol back to the rallying point, complete any necessary reorganization, and return to friendly lines quickly but carefully. If one of the patrol's missions was to search the dead for documents, seize equipment, or take prisoners, that portion of the patrol assigned this task would carry it out while the other members of the patrol would cover them. Then the patrol would withdraw the same as in the first example. If the patrol could not overcome the enemy column, it would become necessary for the patrol to immediately withdraw and move with deliberate speed to the rally point, quickly reorganize, and depart the area. Regardless of what happens, on receiving the signal to withdraw the assault element moves along a previously reconnoitered path to the rally point. Situation permitting, each member of the patrol selects a route to the rally point and walks his route until he can follow it even in the dark. The rally point should be far enough from the ambush site so that there is no danger of its being over-run if the enemy attacks

the ambush. At the rally point, the patrol is checked for missing members and casualties, then moves on its return march. Mines can be pre-located on the side of the withdrawal route and when the patrol withdraws they can be armed to impede the enemy's pursuit.

g. Defense Against Ambush. In planning for defense, the planner must initially consider the friendly forces available. The small unit commander responsible for moving a unit independently through areas where ambush is likely must plan for the formation to be used, march security, communications and control, special equipment, the actions to be taken if ambushed, and the reorganization.

- (1) *Formation.* A formation which provides all-around security is always desirable. However, any formation used should provide security to the unit. In the jungle, troops usually move in a column or file. This is necessary for control purposes due to the dense undergrowth. This growth hinders but does not preclude the use of a point, flank guards, and rear guard. The interval between men should be about 5 yards where visibility permits. The commander should be well forward in the column and the firepower of the unit should be evenly dispersed throughout the column. Then, if ambushed, all of his firepower, machineguns and other major weapons are not knocked out in the initial burst.
- (2) *Security.* Regardless of the formation employed, security to the front, rear, and flanks is necessary when ambush is likely and, in the jungle, ambush is always likely. A front security element should provide its own flank security, be placed well forward, or as far forward as possible and still be in communication with the main body. The front security element must be strong enough to sustain itself until followup units can be deployed to assist in reducing the ambush. Flank security elements in the jungle usually must move adjacent to the column along routes paralleling the direction of march. The flank security elements must, however, be close enough for control and yet distant enough

to preclude jeopardy to the main column in the event it receives fire. Rear security elements perform similarly to the point; it can be used as a maneuver element in the event of ambush.

- (3) *Control.* The use of communications equipment and control measures are the next items the commander considers. All available means of communications are used to assist in maintaining control. In addition, detailed prior planning, briefings, and rehearsals for all personnel will assist if an ambush does occur. It must be remembered that in the jungle there is no substitute for personal contact effected by the patrol leader with his subordinates to insure maximum control of his force.
- (4) *Special equipment.* Additional items of equipment and weapons are sometimes needed by a unit, especially when it moves through areas where guerrillas are likely to be encountered. Additional automatic weapons may be necessary; pioneer tools and mine detectors are used to detect and reduce roadblocks or minefields. Demolition equipment is used to destroy obstacles encountered en route. Additional communications equipment and identification devices such as panel sets, lights, or smoke grenades may be required.
- (5) *Reaction to ambush.* The most effective means of combating an ambush is to prevent this action from being launched against the unit. This is accomplished by constant and correct employment of security. Once ambush is initiated against the column, all weapons must immediately return the fire. This requires discipline, dynamic leadership, and rehearsed plans. Elements must then be made aware that an assault must take place despite the fact that the unit may have suffered heavy casualties. A retrograde movement in lieu of an assault may, in a well-prepared ambush, result in complete annihilation of the friendly unit. Reorganization after an ambush involves the use of rallying points, plans for local security, reconstitution of depleted patrol elements, evacuation of casualties, and further movement based on the unit mission.

42. Counterambush

a. *Dismounted Troops.* Counterambush techniques to be employed by dismounted troops when ambushed are called "immediate action" drills. They apply for use immediately before the unit leader or commander has time to issue any detailed orders. The sudden enemy action in an ambush demands immediate, preplanned reaction (para 36).

b. *Mounted Troops.* Roads are extremely scarce in jungle areas. In some locations, however, the jungle edge is adjacent to roads, making ambush of vehicular columns extremely easy; units must consider the danger of ambush ever present in such areas regardless of the tactical or administrative situation. Although ambush of vehicular columns is a primary tactic of guerrillas, it must be expected that conventional enemy forces will employ this technique whenever possible. When considering a plan for training of troops in countering enemy actions, if attacked while moving in vehicles, two things should be borne in mind. First, the opportunity must be taken to inflict maximum casualties upon the enemy by attack and the resulting action should not be looked upon as a retaliatory measure only. Second, the purpose of guerrillas staging an ambush of a vehicular column is primarily to gain arms, ammunition, and food; consequently, every effort must be expended to prevent these vital supplies from falling into their hands, to include deliberate boobytrapping.

(1) *Typical ambush pattern against motorized elements.*

- (a) Obviously military vehicles will be the primary targets of road ambushes. However, civilian vehicles may be fired upon for propaganda purposes or to create obstacles.
- (b) Most roads in jungle areas run through country offering covered lines of approach and withdrawal and affording covered positions from which to fire on vehicles. Enemy forces, therefore, can be expected to select that part of a road where it would be easy to place a road-block or where vehicles would have to move slowly, such as a climb into a cut, a sharp bend, or a climbing turn.
- (c) Enemy forces can be expected to accept a risk of remaining concentrated at a certain locale for extended periods in order to ambush a lucrative target.

(d) Ambush of motorized elements must be expected at night. Enemy forces will be able to deploy greater fire power using fewer troops because of the ease of concealment afforded by darkness. Some forms of night ambushes might be:

- 1. Fairly heavy sniping fire from different locations within the ambush position at the vehicles in a column.
 - 2. Deliberate ambush of a convoy based on exact information obtained through intelligence.
 - 3. Deliberate ambush of a particular vehicle or vehicles.
- (2) *Countering road ambushes.* There are two ways to prevent or minimize the incidence of ambush on roads. These are:
- (a) Precautionary measures to reduce chances of being ambushed and to insure instant readiness for action.
 - (b) Actions on contact, or immediate action drills, designed to gain the initiative by offensive action.
- (3) *Precautionary measures.* All roads should be classified into categories with the classification being based primarily on estimated enemy action in the areas concerned. Traffic on all roads in combat areas must be rigidly controlled and kept to a minimum. All vehicles must have at least one armed rider as air guard, travel at night must be heavily restricted, use of armored vehicles must be increased with convoys, and information relating to convoy or vehicle movements must be carefully guarded. Every unit should formulate comprehensive standing operating procedures covering movement by roads. This SOP should state clearly who is authorized to put a convoy on the road and should also provide, in detail, information concerning the appointment and duties of convoy and vehicle commanders, the organization of convoys, weapons and basic loads to be carried, instructions regarding windshields, tailgates and tarpaulins of vehicles, stipulated immediate action drills, and instructions to describe security policies. This SOP must be rehearsed in training until all troops respond effectively.

(4) *Actions on contact.* An ambush will always be an unexpected encounter. The only solution to this event is correct and timely reaction of troops. A road ambush will be carefully chosen and converted into a position from which fire from above and at point-blank range can be delivered on a convoy. The principle behind immediate action drills is that it is incorrect to halt in the killing zone unless forced to do so. Drills, then, should teach troops to drive on when fired upon, to halt only when through the ambush killing zone or before running into it and to counterattack immediately from flank and rear.

(a) *Immediate action techniques.* Every effort should be made to get vehicles clear of the killing zone when fire is received. Thus, when vehicles are fired upon:

1. Drivers should not stop but should attempt to drive on until out of the apparent killing zone.
2. Lookout men (three or four to each troop-carrying vehicle) will fire immediately upon the ambush.
3. If vehicles are clear of the killing zone they will be stopped to allow occupants to detruck to carry out offensive actions.
4. Vehicles approaching the killing zone should not attempt to run through the ambush; rather, they should halt clear of the area and discharge occupants for deployment.
5. Drivers will be key men and should be selected accordingly.

(b) *Counterattack.* Ambush positions are vulnerable at their rear and flanks. Offensive actions normally can be carried out only by troops who are clear of the killing zone. If there are no such troops, then a frontal attack under concealment of smoke will be necessary. Some conditions under which counterattacks will be made are:

1. When no troops have entered the killing zone. The convoy commander or, in his absence the senior vehicle commander present, should launch an immediate flanking attack on the ambush

position. All available crew-served weapons should bring supporting fires to bear on the ambush.

2. When all troops are clear ahead of the danger zone. An attack under this condition is liable to be delayed as troops might be moving away from the place of the ambush. Nevertheless, an encircling attack must be organized and launched as soon as troops can concentrate. Who commands and which elements will take the initiative in these circumstances must be spelled out in the unit SOP or other instructions.
3. When some troops are clear ahead of the killing zone and others are halted short of it. With two troop elements on both sides of an ambush, separated by a killing zone, confusion may arise as to which group should attack and, as a consequence, valuable time may be wasted. If both elements attack at the same time without prior coordination, an interunit clash may result.
4. When armor is available. Usually the best way in which an armored vehicle could assist in counterambush would be to drive directly into the killing zone and engage the ambush at point-blank range. This would give good covering fire to the flanking attack made by foot troops and afford some protection to friendly troops caught in the killing zone.
5. When the convoy commander becomes a casualty. Since it is possible that the convoy commander might be killed, wounded, or pinned down in the killing zone, it is essential that all vehicle commanders know their responsibilities for conducting a counterattack. This should be clearly given in unit convoy orders, SOP, or briefings before a convoy moves on a road.

(5) *Bailing out drill.* Usually when an enemy force springs a road ambush all effort will be made to stop as many vehicles as possible in the killing zone by the use of mines or obstacles or by firing at the tires and driver of a vehicle. Therefore, it is essential that troops know how to detruck in-

stantly. This must be taught and practiced as drill during training. The elements of this drill are:

- (a) *Vehicle loading.* All packs and equipment should be placed in the center of the truck. Excessive quantities of equipment or other items should not be loaded into vehicles which are carrying troops. Trucks used for carrying troops should have the tarpaulins and rib bows removed. Sixteen to eighteen men should be the maximum number carried in the back of a 2½ ton truck. If more than this number are carried, they may be unable to use their weapons effectively, get in each other's way, and be difficult for the vehicle commander to control. Similarly, the number of troops carried in other types of vehicles must be restricted to insure freedom of movement.
- (b) *Alertness.* Lookouts should be posted on all four corners of the vehicles or, as a minimum, one in front and one in rear. They should be continuously alert. Other troops should be ready, but need not maintain alert. It will be necessary on long trips to rotate the lookouts. Spare magazines should be in pouches, not in boxes; vehicle lookouts should have grenades available for immediate throwing.
- (c) *Bailing out procedures.* When the vehicle is forced to stop, these procedures should be followed:
 1. The vehicle commander shouts "detruck right" or "detruck left" to indicate the direction in which troops will go to organize.
 2. Vehicle lookouts should throw grenades and open fire immediately on the ambush position.
 3. Troops should detruck over both sides and not from the rear of vehicles and run in the direction indicated by the vehicle commander.
 4. As soon as troops clear the vehicle, lookouts should join those who evacuated the truck.
 5. At this stage the immediate task is to collect the fit men for counteraction.

Wounded soldiers must be dealt with after the action has terminated.

6. The above, and many other possible variations, should be made into SOP's and practiced until a high degree of proficiency is attained.

43. Guerrilla and Counter guerrilla Operations

Jungle terrain favors the conduct of guerrilla warfare. It should be considered essential by commanders that maximum training in guerrilla and counter guerrilla warfare be given to troops who are receiving jungle training. Integration of guerrilla and counter guerrilla training should be effected for all other training, as appropriate. Training should progress from an analysis of the guerrilla as an individual to the causes, requirements, and methods of operation which are common to resistance movements. Stress should then be placed on the operational phase of this warfare with particular emphasis on counter guerrilla actions by small units. For further information concerning training on this subject, see FM 21-50, FM 21-75, FM 31-16, FM 31-21 and FM 31-22.

44. Jungle Base Operations

Because of the nature of jungle terrain, operations by small units are usual. This will often require deep penetration of hostile territory and the conduct of protracted, unsupported operations. Jungle base exercises afford an excellent means of training troops in clandestine base operations and furnish a vehicle for the carrying out of an effective, and practical, training program. For a discussion of operations conducted from a forward jungle base see Chapter 5 of this manual.

45. Small Boat Handling

a. General. One of the easiest ways to travel in the jungle is by water. It is essential that units become proficient in the correct manipulation of standard small watercraft which are suited to jungle operations. This will enable small units or groups to employ not only standard small boats as available but will increase the efficiency of troops when utilizing available native watercrafts, because the principles and procedures are the same. Common sense will indicate the variations in procedures necessary for different type boats.

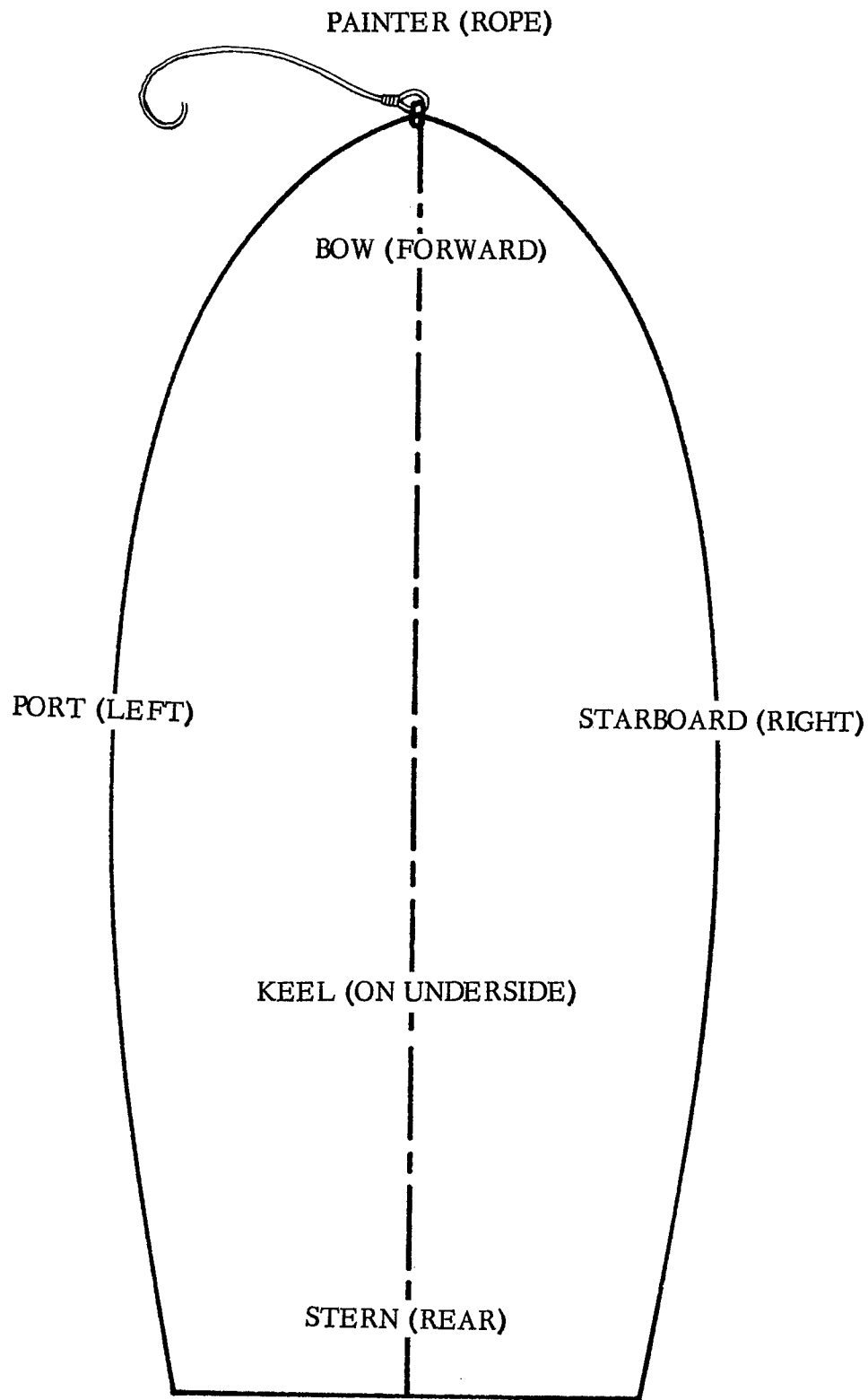
b. *General Description of Standard Small Boats.*

- (1) *Three-man reconnaissance boat.* This craft is designed for transporting three men and their equipment on general reconnaissance missions. The boat is supported by four inflatable sections, any one of which will support three men in the event of an emergency. When inflated, this boat is 9 feet in length and 4 feet in width. It is portable, weighing 31 pounds including the carrying case, hand pump, repair kit, and three paddles (fig. 126). It is propelled by paddles only. In common with all other boats it has a standard nomenclature (fig 127).
- (2) *Five-man reconnaissance boat.* This boat is used primarily for reconnaissance and combat patrols. It weighs 120 pounds, has a maximum cargo capacity of 2000 pounds and is propelled by paddles only.
- (3) *Plastic assault boat.* The assault boat, plastic, 16-foot, can carry 12 combat equipped troops plus a 3-man engineer crew or a maximum payload of 3,375 pounds. It has a shallow draft, extremely rugged construction, and weighs 291 pounds. Eight men, using the handles on the side of the boat, can carry it. This boat will sink if capsized or filled with water. The plastic assault boat can be propelled by a 25 horsepower outboard motor or by the use of paddles. If silence is desired when using paddles, sandbags should be wrapped around the paddle handles to minimize the noise resulting when the handle inadvertently strikes the side of the boat.
- (4) *Fifteen-man assault boat.* The boat, landing, inflatable, assault craft, nylon cloth, 15-man, is designed to transport men and equipment across streams or other water obstacles during assault operations. It weighs approximately 260 pounds including paddles, repair kit, carrying case and pumps. Eight men, using the handles on the sides, can carry the boat. The maximum cargo capacity is 3,300 pounds. This boat can be inflated in 20 minutes by a trained crew. A 25 horsepower outboard motor or paddles may be used for propul-

sion. Care must be exercised when operating the boat with the outboard motor as sudden surges of power can damage the fabric securing the transom.

c. *Boat Teams.*

- (1) *The coxswain.* The size of a boat team depends on the size and type of boat. Regardless of size, each boat should have a coxswain. The most experienced and best qualified man in the boat is normally the coxswain. The coxswain is responsible for the order to embark and disembark, the order to beach and launch the boat, the distribution of equipment in the boat, the maintenance of the course and speed and preventive maintenance and care of the boat while under his control. Patrol leaders should not act as coxswain of a boat as they will be occupied with the primary duty of patrol orientation and navigation. The coxswain helps steer the boat by putting his paddle in the water behind the stern, using it as a rudder.
- (2) *Crew organization.* A group of soldiers assigned to a boat must first line up and "Count Off". This crew, having counted off, positions itself on both sides of the boat, odd-numbered men on the right and even-numbered men on the left. Figure 128 shows the proper positioning of crewmen in a five-man boat.
 - (a) The number 1 man is the stroke. He sets the rate of paddling in accordance with the coxswain's orders. This man should be physically strong in order to maintain a powerful and constant stroke. Both numbers 1 and 2 are responsible for holding the boat off rocks and deadfall. All crew members must be on the alert for sweepers. Sweepers are trees that have been pulled into the river or streams from collapsing banks. Usually the tops of these trees bob up and down on the surface. These sweepers are extremely dangerous; running into one can overturn or tear a boat.
 - (b) Passengers take positions in the boat as directed by the coxswain, normally after most of the crew is in position. There should be at least two men stabilizing



THE UPPER PORTION OF BOTH SIDES IS THE GUNWALE OR GUNNEL

Figure 127. Nomenclature of a standard small boat.

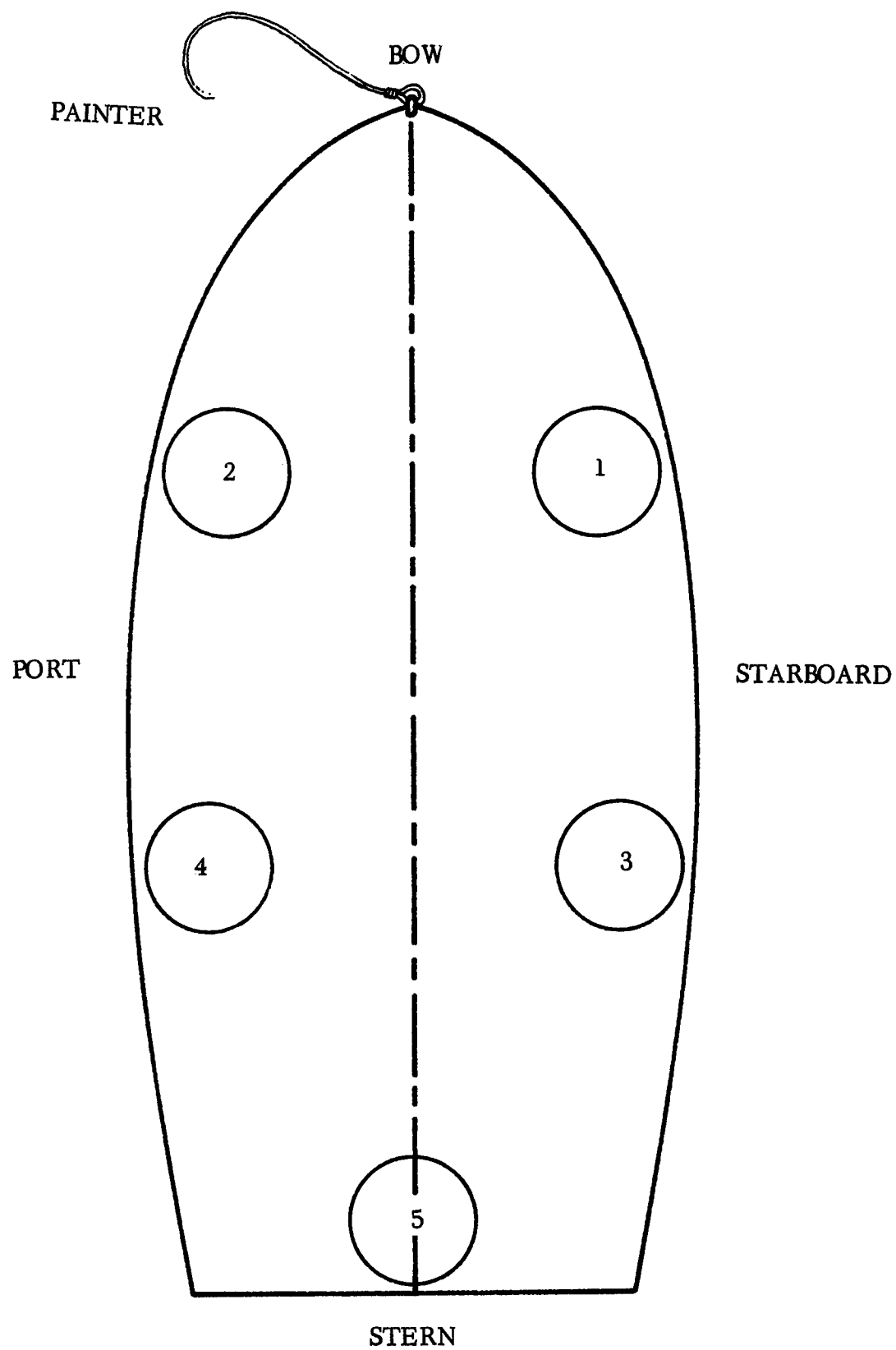


Figure 128. Positions of crewmen in a 5-man boat.

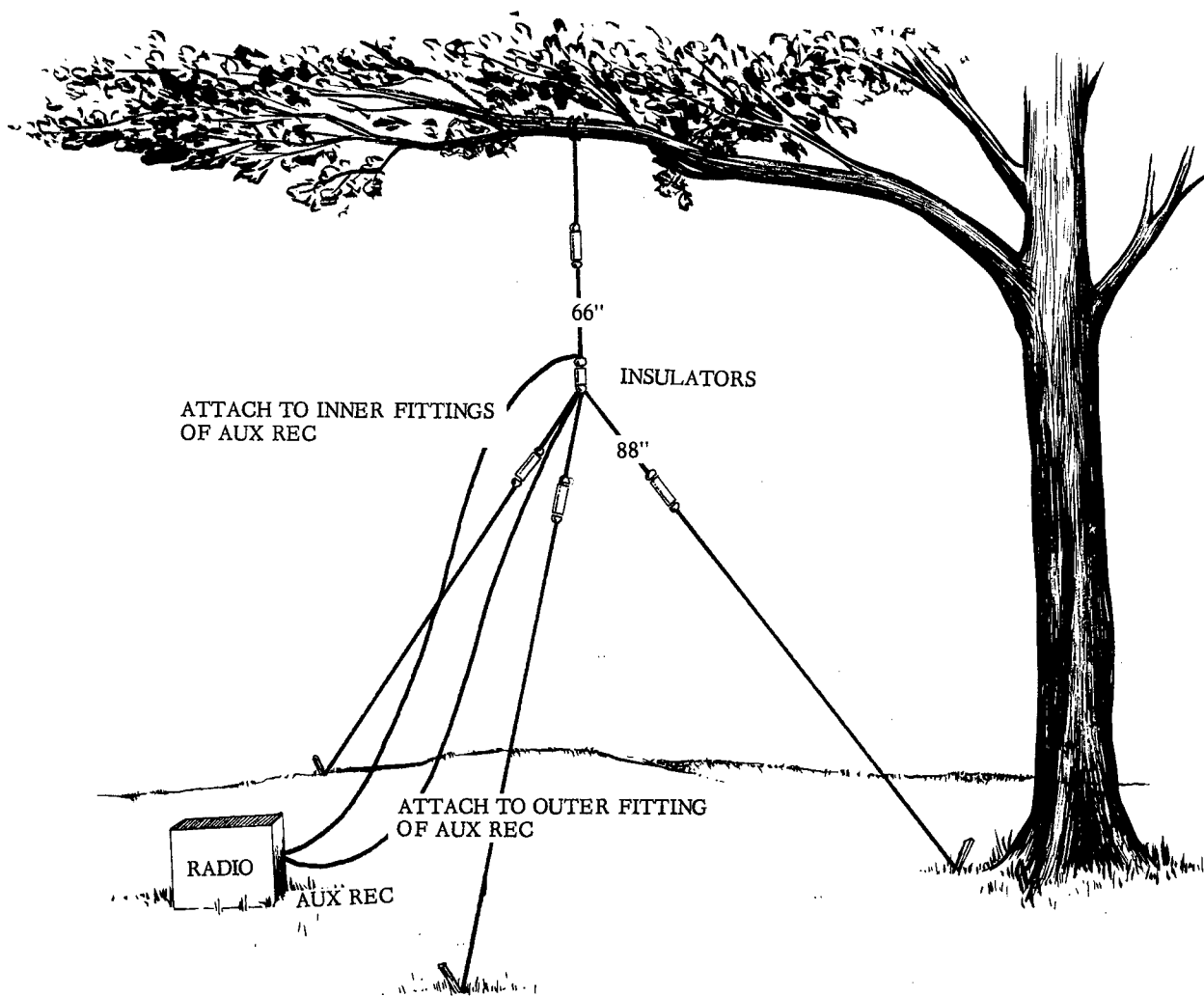


Figure 129. RC-292 field expedient antenna.

the boat as passengers enter. The payload capacity of the boat should not be exceeded.

- (c) As all of the small boats discussed here may be propelled by paddling and, as this will usually be the only means for propulsion, the method should be considered in detail. The paddle is grasped with the inboard (toward center of boat) hand over the top of the paddle and outboard (toward side of boat) hand on the handle near the blade. The outboard hand acts as a pivot point (fulcrum) as the inboard hand moves forward. The kneeling position is used in the plastic

assault boat. For long movements, it is recommended that crew members kneel on sandbags in order to alleviate discomfort. In the inflatable boats, the crew sits on the gunwales. A rate of 30 strokes a minute is generally satisfactory.

- (3) *Commands.* The commands which the coxswain uses can be divided into two classes: formal commands and informal commands. The formal commands are used to move the boat on land and in the water. The informal commands are used to launch, load and beach the boat.

- NOTES: 1. MAY BE CONSTRUCTED WITH ANY TYPE FIELD WIRE.
2. MUST BE AIMED AT THE RECEIVING STATION WITH THE RADIO END AT THE BASE.
3. CAN BE USED WITH FM RADIOS BETWEEN 20-60 Mc.

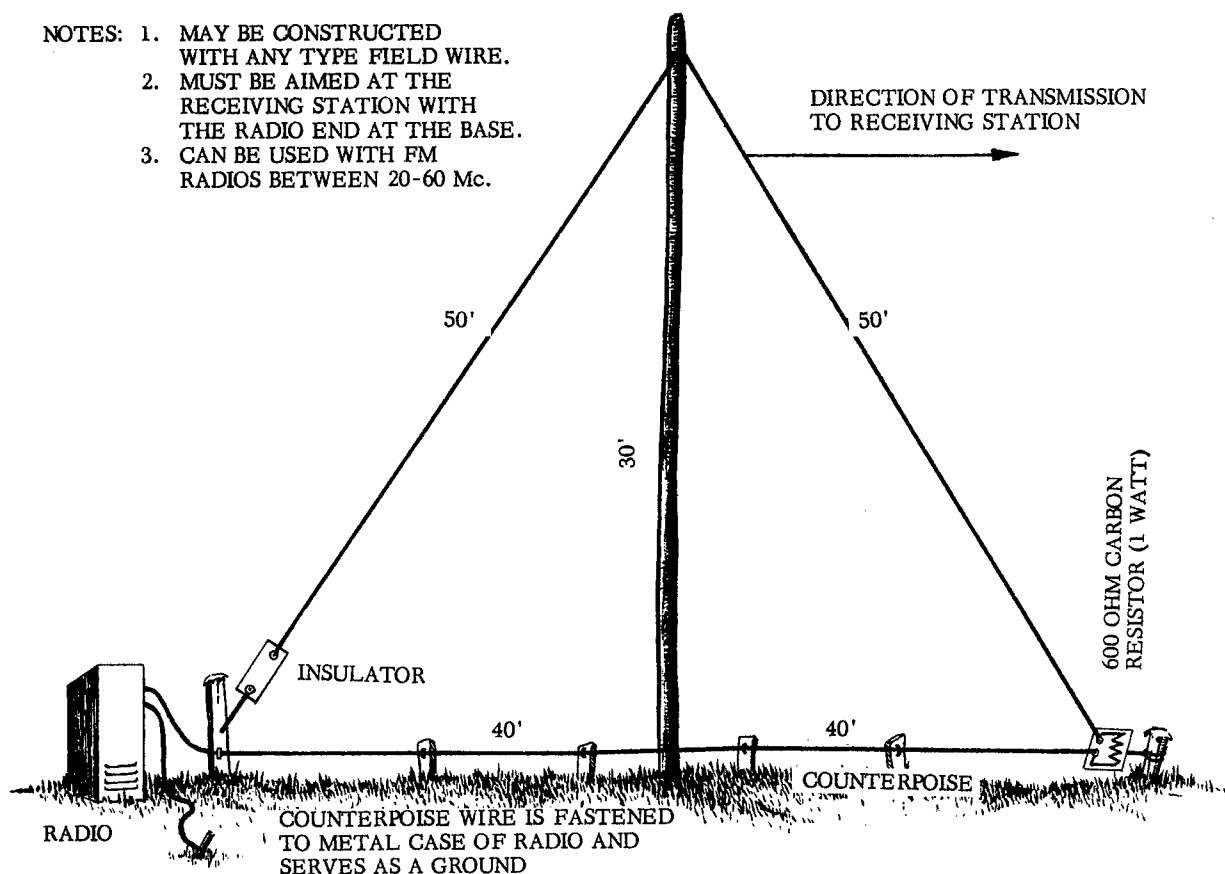


Figure 130. Half-rhombic field expedient antenna.

(a) *Formal commands.*

1. **BOAT STATIONS, MOVE.** Prior to giving this command, the coxswain must assign each member of the boat team by name to a position, i.e., "Smith is #1 man, Jones is #2 man, Doe is #3 man, and Johnson is #4 man". When command, **BOAT STATIONS, MOVE**, is given, team members move to their positions around the boat.
2. **LOW CARRY, MOVE.** On the preparatory command, **LOW CARRY**, team members reach down and grasp the boat carrying handles, even numbered men grasping with their right hands, odd numbered men with their left. On command, **MOVE**, men raise the boat to knee height.
3. **HIGH CARRY, MOVE.** When the boat is on the ground, team members face to the rear of the boat, crouch,

and grasp the boat carrying handles, even numbered members with their left hands, odd numbered men with their right. The other hand is put under the boat or positioned ready to be put under the boat. On the command, **MOVE**, team members lift while rising up and facing about toward the center of the boat. The boat should then be resting on the men's shoulders. When the boat is at the **LOW CARRY**, on the preparatory command **HIGH CARRY**, team members grasp the carrying handles with the opposite hand. On the command, **MOVE**, all men crouch slightly; simultaneously, odd numbered men lift the boat by the carrying handles with their right hands, even numbered men doing so with their left. All men rise from the slight crouch and lift the bottom of the boat with the hand not

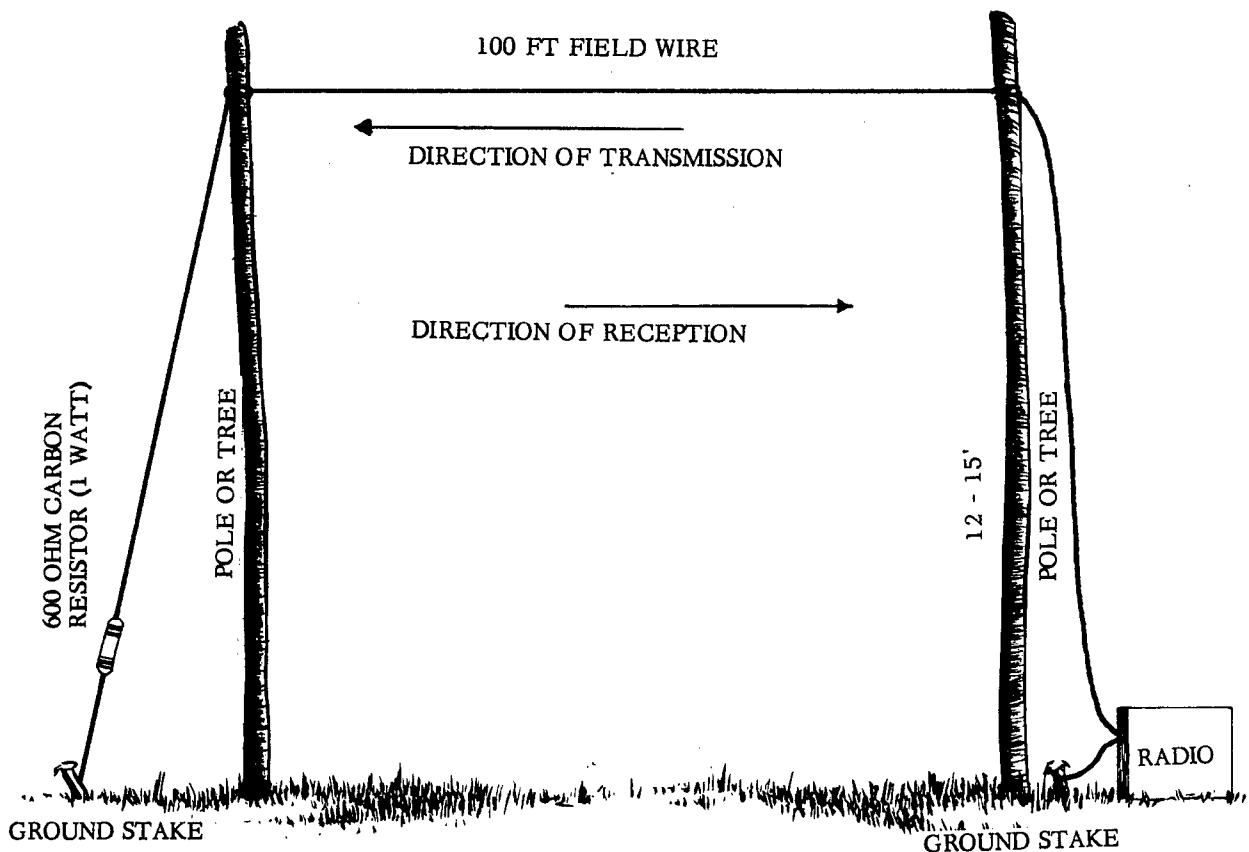


Figure 131. Long-wire expedient antenna (wave antenna for frequencies between 20-80 MC).

grasping the carrying handle. The boat should then be resting on the carriers' shoulders.

4. LOWER THE BOAT, MOVE. On the command MOVE, team members lower the boat slowly and evenly.
5. GIVE WAY TOGETHER. All men paddle keeping in stroke with the number one man.
6. GIVE WAY RIGHT. Odd numbered men paddle, in unison.
7. GIVE WAY LEFT. Even numbered men paddle, in unison.
8. HOLD WATER. All men keep paddles in water, but do not move them.
9. HOLD WATER, RIGHT. Odd numbered men keep paddles in water, but do not move them. This will cause the boat to turn to the right, if the even numbered men are paddling forward.
10. HOLD WATER, LEFT. Even numbered men keep paddles in water, but do not move them. This will cause the boat to turn to the left, if the odd numbered men are paddling forward.
11. BACK WATER. All men paddle from rear to front. This will cause the boat to move rearward.
12. BACK WATER RIGHT. Odd numbered men row from rear to front. This will cause the boat to turn right.
13. BACK WATER LEFT. Even numbered men row from rear to front. This will cause boat to turn left.
14. PULL WATER RIGHT. Odd numbered men reach out to the side with paddle, put paddle in water and pull toward boat. This moves the boat at a right angle to the keel and to the right.
15. PULL WATER LEFT. Even numbered men reach out to the side with

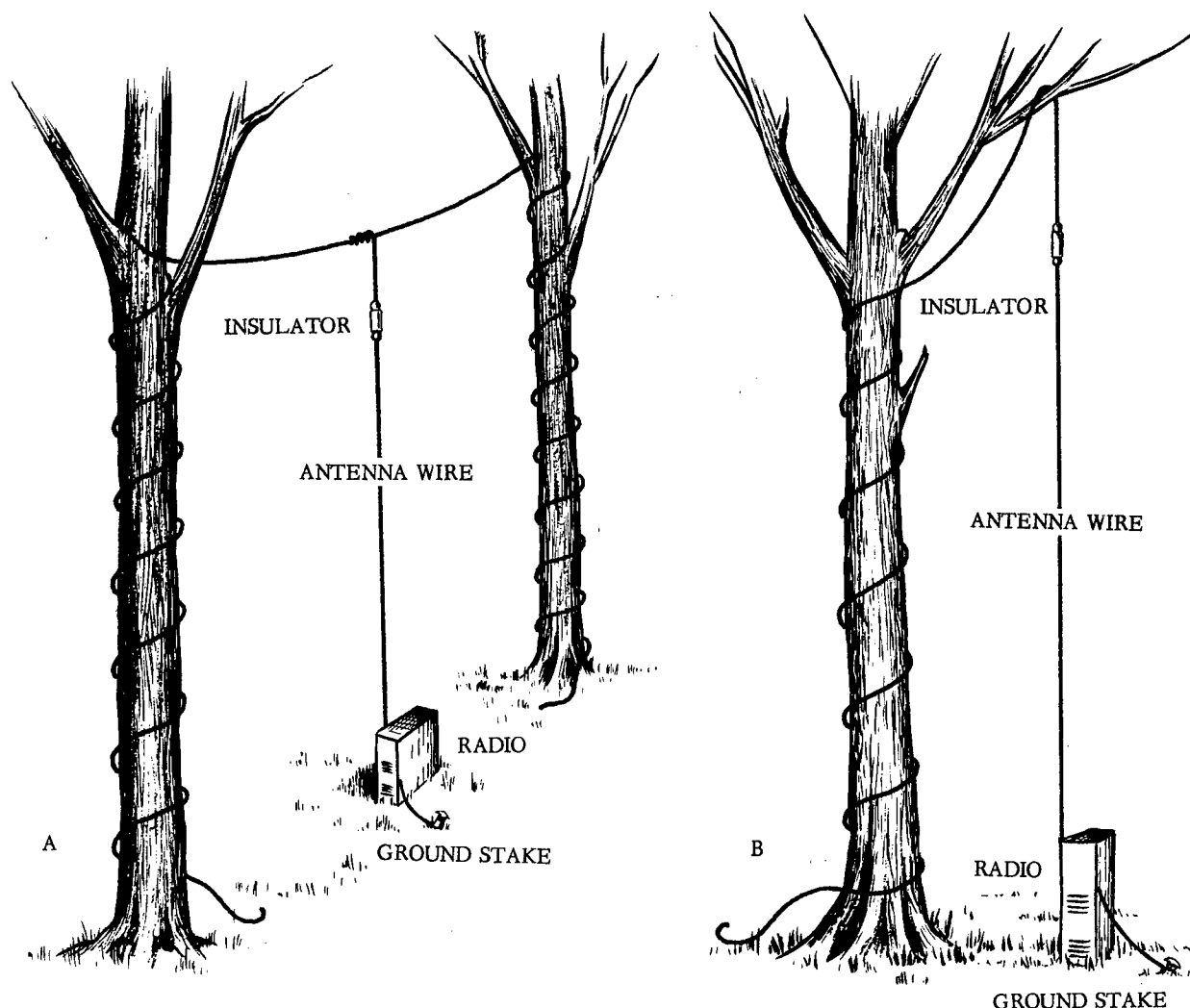


Figure 132. Vertical wire expedient antennas.

paddle, put paddle in water and pull toward boat. This moves the boat at a right angle to the keel and to the left.

16. **REST PADDLES.** All men holding paddles on horizontal plane across gunwale.

(b) *Informal commands.* At loading sites where the ground or beach slopes gradually, the coxswain guides the boat to the water's edge and then moves to the rear of the boat. The boat team uses the low carry and moves into the water until the numbers 1 and 2 men are, at least, knee deep. The coxswain then commands "One and two men, into the boat". Num-

bers 1 and 2 take their positions in the boat. When all crewmen have entered the boat the coxswain is the last to board. When the ground does not slope gradually, the boat can be loaded from side or stern.

1. The coxswain first commands, "Launch the boat", and the team members put the boat into the water, getting as little water into the boat as possible. The coxswain then orders the team into the boat two at a time.
2. When beaching the boat, the team debarks on order from the coxswain, "One and two men, out of the boat; three and

four men, out of the boat". When all persons are out of the boat, the coxswain gives the command, LOW CARRY, MOVE, and leads the team to a predesignated area. If the water is more than waist deep at the shoreline, the troops will step from ship to shore and pull the boat from the water as commanded by the coxswain.

(c) *Special commands.*

1. Certain commands may be combined to execute rapid maneuvers. For example, if the coxswain desires a sharp turn to the left he can order BACK WATER, LEFT; GIVE WAY, RIGHT, and at the same time, manipulate the blade of his paddle to the left.
2. There is one command used in boat drill that can be classified neither as formal nor informal. It is a practice command only. This command is FALL OUT, ONE. During practical work every soldier should have a chance to be coxswain. FALL OUT, ONE is the command to exchange coxswains. After a coxswain has given commands for 5 to 10 minutes, he will order, FALL OUT, ONE. At this command the number 1 man crouches low and moves to the rear of the boat to assume the coxswain's former position. All other men on the right side move up one position and the former coxswain fills the last space on the right side. All of these movements are made simultaneously. When all men on the right side have been coxswain, the command changes to FALL OUT, TWO.

d. Righting Capsized Boats. All troops should be conditioned to react rapidly to the situations in which boats are overturned. The procedures outlined here should be required practice in training. Upon the capsizing of a boat the coxswain secures all of the paddles and directs one-half of the crew to stay in the water and prepare to push upward upon the gunwale of that side of the boat which is to be raised. The other half of the crew climbs atop the capsized boat, grasps the safety rope on the side to be raised, and holding onto the rope, falls back-

ward into the water, pulling the boat over on top of them. It may be necessary to attach sling ropes to rings on the gunwale in order to have a sufficient piece of rope to grasp. (For detailed information on river navigation, see paragraph 60, FM 21-50.)

e. Water Safety. All members of a boat team are responsible to insure that safety procedures are followed. The coxswain is especially charged with observing and enforcing safety rules during operations involving his boat. The coxswain must be a competent individual and his orders must be obeyed. It is his job to see that personnel and equipment are balanced in the boat. Other safety hints are:

- (1) All equipment placed in the boat should be secured to the boat to prevent shifting or loss in the event of a capsized craft. If such items as machine guns are carried they should be tied to the boat. This can be done by tying one end of a short rope to the machine gun and the other end to the safety line of the rubber boats or the carrying handles of the plastic boats.
- (2) Rifles should be slung across the body with the muzzle pointing outboard to minimize the chance of passengers or crewmen being hit by the rifle barrels. The sling should be tied to the upper sling swivel by means of a half hitch to prevent accidental loss of the weapon.
- (3) Life preservers should be worn when engaged in over-water operations. Life jackets and inflatable life preservers should be put on prior to launching the boat.
- (4) The maximum payload of a small boat should not be exceeded.

46. Communications and Communications Expedients

a. General. Jungle terrain limits normal use of communications. The greatest limitations are caused by vegetation and irregular terrain. Correct installation, utilization, and operation of communications equipment must be emphasized. Special attention in training must be given to employment of expedient antennas to boost radio transmission and reception.

b. Types of Communications. The five types of communications are Visual, Sound, Messenger, Wire, and Radio. Each plays an important role in

the makeup of an effective system in wet tropical terrain (FM 7-24).

- (1) *Messenger.* Probably the greatest restriction is placed on the messenger or messengers. In the jungle, messengers should be employed in pairs. Messengers in tropical areas find the obstacles they face more difficult to overcome than in any other area. Because of the almost complete lack of trail or road networks they must make their way through thick vegetation. The irregular terrain presents many obstacles such as cliffs, swamps, rivers, and the like to their passage. This is a time consuming factor. Coupled with these difficulties is the problem of navigation. They must have a thorough knowledge of map and compass reading plus the ability to put these skills to practical use. Therefore, the messenger must be competent, resourceful and well trained. Messengers are considered the most secure means to convey information; however, in the jungle they will be very slow. Aerial messenger service using drop and pick-up techniques may be employed to augment ground messenger service wherever conditions permit. Thus, obstacles confronting ground messengers in tropical areas may be largely overcome.
- (2) *Visual and sound systems.* These means of communication will be grouped together for the purpose of discussion. When electrical means of communications are not available or are considered inadequate for the existing situation, an effective visual or sound system must be employed. Normally visual and sound communication systems are employed within the smaller units, such as platoon, squad, and fire team. The visual and sound systems consist of hand and arm signals, pyrotechnics, mechanically produced sounds and oral sounds. Hand and arm signals are detailed in FM 21-60. Additional signals can be used; however, as long as all personnel know their meaning. Due to the dense vegetation and poor visibility, each man within the unit must be trained not only to understand these signals but to repeat each signal that he receives. Seldom will the

commander have visual contact with every element or member of his unit and the repeating of signals will provide for maximum dissemination of instructions. The use of pyrotechnics or smoke as a signalling device is limited to prescribed or prearranged signals as each unit must be aware of the meaning of each signal. In most units these are listed in the signal instructions; however, in small unit actions their use is left to the discretion of the unit commander. In addition to requiring each individual to know the meaning of the different smokes and pyrotechnics, a sentinel or lookout must be posted to observe their use. It is possible, due to the poor visibility, that a signal may be unobserved in spite of all measures taken to provide for observation. Pyrotechnics and smoke may be used as signals between individuals, units, and from ground to air, or air to ground. They are visible over a greater distance when employed against terrain of contrasting color. Green and white smoke are considered poor signalling devices in jungle terrain. Green, once dissipation begins, tends to blend with the green foliage and is difficult to distinguish from any but a short distance. White, once it begins to rise, resembles ground fog or low hanging clouds or haze. Due to the striking contrasts of color, red and yellow smoke are very effective signalling colors in the jungle. It must be remembered, however, that red is a common danger signal, especially when used in air operations, and this should be considered when planning the signal phase of an operation. Among the most commonly used pyrotechnics are rifle grenade smoke streamers and ground signals. The aircraft signal and the sound and flash are both fired from the pistol, pyrotechnic projector, hand, M8, commonly called the "Very Pistol". Outwardly the signals are similar in appearance as each resembles a large shot shell with an aluminum case. Depending on weather conditions, these signals may be visible at a distance of 5 miles at night and 2 to 3 miles during daylight. The aircraft signal was originally designed for ground to air-

craft or aircraft to ground signalling. However, since the projectors are light and compact, they proved suitable for use by ground forces. The present aircraft signals consist of one star, two stars, or a tracer and two stars. The sound and flash signal, also fired by the "Very Pistol", was originally designed for use by umpires during training exercises to simulate artillery air bursts and to mark artillery fire. However, it has been found that the sound flash also proves an effective signal for guiding aircraft in both day and night operations in the jungle. The hand-held ground parachute illumination signals are far superior to those already mentioned. The hand flare can be obtained in two colors, white and red. White allows the most illumination, burning at about 60,000 candle power. Both will burn for approximately 35 seconds and from a good vantage point can be seen for many miles. In considering mechanically produced sound it must be noted that the heavy foliage of jungle cuts the distance this sound will travel. Therefore when planning for the use of such a signal, tests should be conducted to determine whether or not the signal is adequate. Such sounds as striking the butt of a rifle with a rock, whistles, and even bugles are examples of mechanically produced sounds used quite extensively by small groups. Limitations are imposed, in that again, each individual must know the meaning of the signals and must be able to hear them above the noise of battle. Insofar as the oral sounds are concerned, voice commands are the most common. It is sufficient to say that they can be modified in any number of ways to suit a particular situation. The main thing to remember is that as long as both parties know what a certain sound means it will be an effective signal. The advantage of sound signals are that they are hasty, require little or no equipment, and are simple to code. The major disadvantage is that the vegetation and terrain have a tendency to muffle the sound and shorten the range of the signal. Sound signals are usually unreliable during battle due to battle noises.

(3) *Wire.* The limitations imposed by the jungle on other means of communications cause a greater dependency upon wire. Wire is highly vulnerable to guerrilla destruction or interception. When secure, wire is considered as the most reliable means of communications in wet tropical terrain. Wire communication in jungle terrain imposes limitations similar to those of heavily wooded areas in temperate climates, but the problems are more acute in the wet tropics. Frequent rain and constant dampness reduce the effective range of wire circuits. Wire lines should be installed in trees or from poles, if possible. It also may be necessary to use amplifying telephone devices.

(a) *Ground-laid wire.* When discussing ground-laid wire it must be realized that wire routes are limited and the few that are available will be heavily traveled. When laying wire along trails care should be taken to insure that the wire line is well off the trail. Communications personnel must be well trained to observe this precaution. One of the advantages of ground-laid wire is its ease of maintenance provided that it is laid properly in the beginning. This is based on the assumption that the wire can be maintained anywhere it can be laid by hand. Ground-laid wire is also 100 percent recoverable. Ground-laid wire also has its disadvantages. It is limited in its coverage because it would be impracticable to lay wire to all units in a fast moving situation. As previously stated, roads and trails are limited and this requires much of the wire to be laid cross country, over cliffs and in swamp areas. For these reasons, the installation of unit lines is a time-consuming operation. Further, maintenance and security of ground-laid field wire circuits is complicated by frequent enemy infiltration. Infiltrators have been known to cut wire lines and then ambush unsuspecting wire repair crews.

(b) *Air-laid wire.* The laying of wire by an aircraft is extremely fast and saves the

expenditure of physical effort by communications personnel. The distance wire can be laid by aircraft is limited only by the carrying capacity of the plane. The helicopter is the best aerial wire laying vehicle. Observation helicopters can lay 5 miles of wire; utility helicopters can carry and lay at least 20 miles. Compromise of air-laid wire is very difficult as the wire generally lies on top of the canopy of the trees. A limitation of air-laid wire is that a positive signalling method must be utilized between the aircraft and the units on the ground. The pilot must not only know the exact spot to start laying wire but exactly where it is to be terminated. A weight and a smoke grenade should be tied to the dispenser as it is dropped, marking the wire as it lands in the jungle. Maintenance of air-laid wire is extremely difficult because the wire lays on the tree canopy and in most cases it is easier to lay a new line than repair one no longer operational. Air-laid wire is also hard to recover. It has been found that approximately 50 percent is recoverable.

- (4) *Radio.* The radio offers a relatively extensive communications coverage in the jungle when compared to the means already discussed. FM (frequency modulated) infantry battalion radios have matching or overlapping operational characteristics which permit intercommunication between any or all of these sets in a single network. Their compact construction also facilitates transport in jungle operations. However, the dense jungle vegetation and broken terrain coupled with the line of sight transmission limitation of FM radios results in a reduction in range.

- (a) *Operation of radios in the jungle.* The capabilities and efficiency of radio communications in the jungle is impaired considerably below the normal. Obstacles to radio communications in the jungle can be minimized significantly by employing the following techniques. (See also chapter 5, FM 24-18.)

1. Use a headset in place of a handset or loudspeaker to receive a weak signal. This will reduce the effects of noise.
 2. Speak directly into the handset or microphone slowly and clearly. Make sure the handset or microphone is in good condition.
 3. Make certain that the radio batteries are fresh and provide adequate voltage for operation. Jungle heat accelerates the battery chemical action and will shorten battery life, necessitating more frequent replacement.
 4. Select, where possible, a location for best transmission and reception. Moving even a short distance may improve operation.
 5. Use CW (continuous wave) instead of voice operation where weak signals are encountered (applies particularly to AM radio sets).
 6. When tuned to the lower frequencies in the FM range or when using an AM set, by tilting the antenna it may be possible to reflect the signal from the ionosphere if ground obstructions block ground wave signals.
 7. Increase antenna length and retune the set or use a proper expedient antenna to improve range. (See figures 129 through 133 and chapter 7, FM 24-18 for examples.)
- (b) *Expedient antennas.* Standard field radio antennas are whip or rod type from which ground and direct waves radiate horizontally. Due to the nature of the terrain and vegetation in the jungle the ground wave is quickly absorbed or screened, or both. It is therefore necessary to radiate a sky wave which is reflected to a distant station from the ionosphere. For efficient sky wave radiation a wire antenna cut to a length proportional to frequency is required. Expedient antennas are discussed below. Additional information is available in FM 24-18.
1. *General requirements for efficient antenna expedients.*
 - (a) Wire that is used must be in good condition.

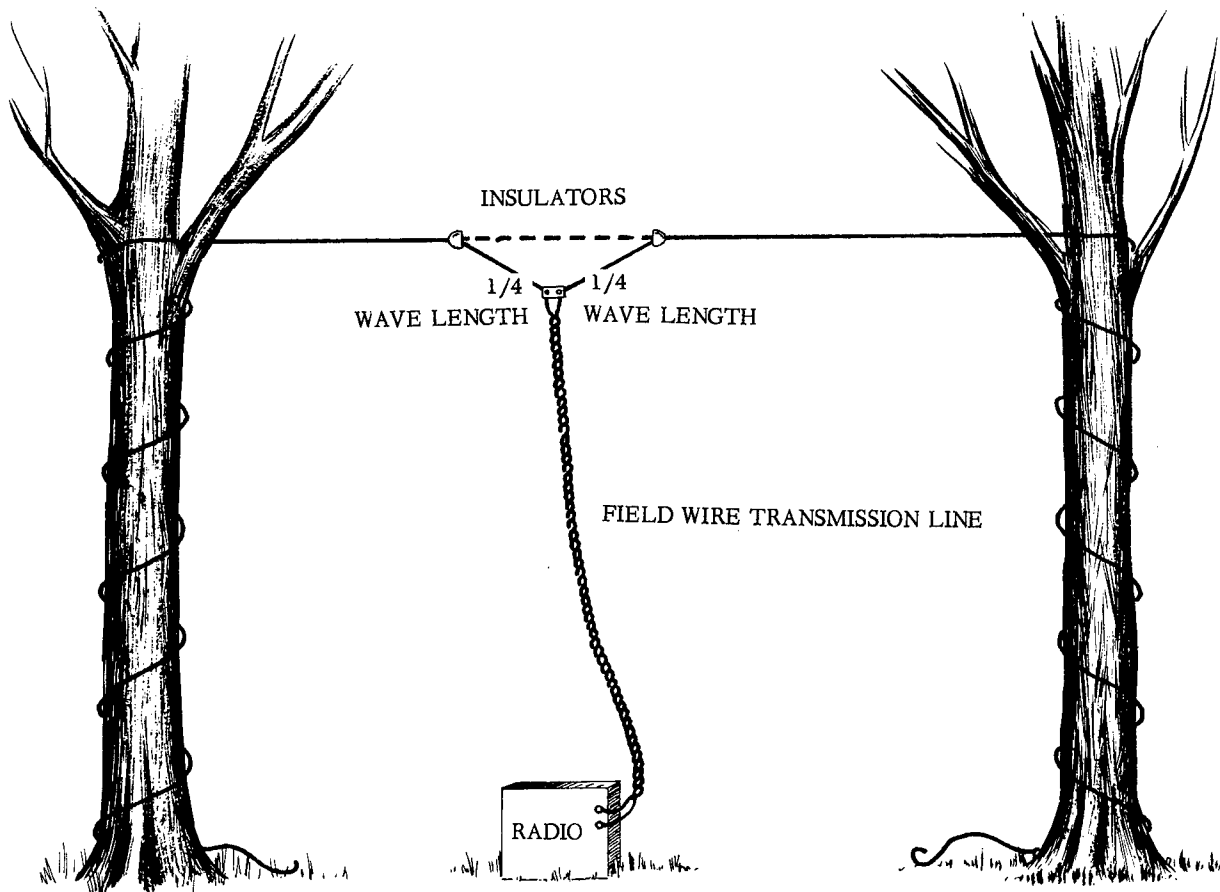


Figure 133. Half-wave (center fed) expedient antenna.

- (b) Wire must be held clear of vegetation and all other materials by insulators.
 - (c) Vegetation should, whenever possible, be cleared from above and below the antenna (the earth acts as a reflector).
 - (d) Directional properties are critical and the best reception of a signal will be realized if the length of the antenna is at right angles to the direction of the required station.
 - (e) All receiving and transmitting sets should be located on high ground and in line of sight to obtain the maximum efficiency of the sets and the antennas.
2. *RC-292 field expedient* (fig 129). This expedient is an antenna which will afford an increase up to $3\frac{1}{2}$ times the

jungle-rated range of a set and is non-directional in nature. The top or vertical wire is 66 inches in length and the three bottom wires are 88 inches in length. The wires are at an angle of 120° from the top wire. All terminate with insulators. The lead wire for the ground plain goes to the radio and is grounded to the side of the radio case. The antenna lead wire goes to the inner recess of the auxiliary receptacle. When using radios other than the AN/PRC-10, the vertical wire should be the same length as the standard antenna of the set (TM 11-666). The antenna head should be at a height of at least 30 feet.

3. *Half-rhombic expedient* (fig 130). This expedient is a directional antenna which will give up to $2\frac{1}{2}$ times the



Figure 134. Example of free drop load to be dropped over water. Cans are half filled to prevent them from bursting on impact. Unopened "C" ration cases can be dropped on land or water. On water they will float, on land they will sustain a certain amount of breakage depending on height and speed of aircraft.

jungle-rated range of a radio. It consists of 100 feet of telephone field wire strung from the ground over a pole 30 feet high and back to the ground. The wire is terminated in an insulator and tied to stakes, both 40 feet from the pole. The ground, or "counterpoise" wire is 80 feet long and can be on the ground or on stakes. Located on the end opposite the radio is a 500 to 600 OHM resistor in a terminal box. This resistor gives the antenna its directional capability. The antenna transmits off the end that is terminated in the resistor, or the end opposite from the radio. The antenna wire is terminated in the auxiliary receptacle on the radio, while the counterpoise wire is grounded on the side of the case or on a ground stake. The receiving station must be on the azimuth as the antenna.

4. *Long wire expedient* (fig 131). The long wire antenna can increase the jungle-rated range of a radio by as much as two times. The long wire antenna consists of 100 feet of telephone field wire strung 12 to 15 feet above the ground. It has a 600-ohm resistor on the wire at the end opposite from which the radio is to be operated. The far end of the wire below the resistor is grounded or attached to a suitable counterpoise where good ground is not possible. The antenna wire is terminated in the inner connection of the auxiliary receptacle on the radio. The radio is also grounded or a suitable counterpoise substituted. This antenna, like the half-rhombic, is directional in nature.
5. *Vertical wire expedient* (fig 132). In case the rod or whip antenna provided as part of the radio is damaged beyond repair a suitable vertical wire expedient may be constructed. It consists of a length of telephone field wire attached to the auxiliary receptacle on the radio with the opposite end terminating in the insulator. The antenna wire must not touch any part of the tree branch or it will lose much of its efficiency.

For best results, the wire should be cut to the same electrical length as the antenna supplied with the set. The vertical wire expedient is omnidirectional and, if properly constructed, will provide the same quality of service as the antenna for which it substitutes.

6. *Half-wave expedient* (fig 133). The half-wave expedient antenna is usually horizontal and is bi-directional with the direction of transmission broadside to the antenna. It may be constructed from ordinary telephone field wire and oriented at any angle from horizontal to vertical to obtain best performance. In most instances, a properly oriented and constructed half-wave antenna will produce better results than the rod or whip provided with the radio. A double-wire feeder (transmission line) connects the radio to the antenna at the center insulator, and the other wire to the other side. The length of the antenna wire should be cut closely to the correct length according to formula ($\text{Length} = 468 / \text{Frequency in Megacycles}$). Also, the length of the transmission line should be adjusted to obtain the maximum signal strength from the antenna.

47. Supply and Evacuation Techniques

a. *General.* Of all the characteristics of jungle areas there is one peculiar aspect which will compound the problems of operations of deep penetration more than any other single quality. This is the scarcity or, in some cases, the complete absence of road, trail, or rail networks. The effects that this scarcity or lack of surface communication routes have on logistics is not hard to imagine. The depth to which an attack can be carried, especially in the jungle, is dependent largely upon the ability of the attacker to supply and resupply its elements. In view of this, training for jungle operations requires more emphasis on techniques of supply and evacuation.

b. *Modes of Transportation in the Jungle.*

- (1) *Hand portage.* The basic means of transportation is hand portage by troops or indigenous personnel. Carrying parties,

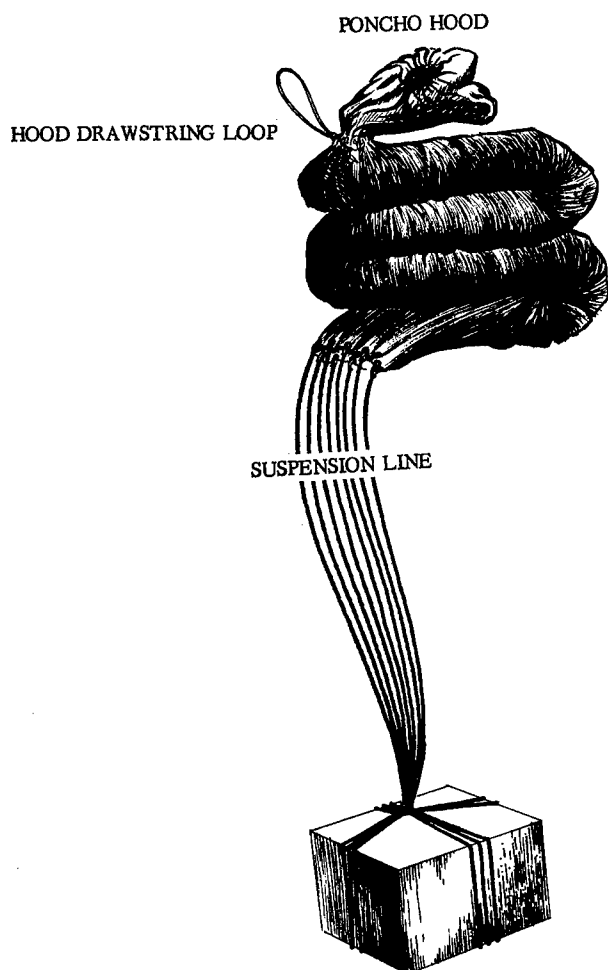


Figure 135. The "M" fold for the poncho expedient parachute.

whether military or indigenous, must be provided with all around security to protect supplies from ambush.

(a) *Equipment for carrying parties.*

1. *Pack board.* The issue pack board is a serviceable carryall. A substitute is an improvised pack board made of wood, canvas, and rope.
2. *Stokes litter.* For evacuation of casualties the best litter available is the Stokes metal litter which weighs 31½ pounds. This litter is of rigid construction and will not collapse should one of the bearers fall. Additionally, it can be rappelled down cliffs. An expedient litter made from two poles and two

fatigue jackets is useful in the event of emergencies.

- (b) *Physical condition of troops.* Movement of troops who must pack their own equipment and supplies is very slow and distances covered each day will be greatly reduced. This must be taken into consideration when planning cross-country movement.
- (2) *Pack animals.* The United States Army no longer has pack animal units. There are native animal handlers and pack animals in most tropical areas which can carry relatively large loads over difficult terrain. The load is dependent upon the distance to be traveled, the terrain and the rate of march. Use of native handlers and pack animals is extremely advantageous because it preserves the combat efficiency of the troop units. Clothing, footgear, rations, supervision, and security should be provided by the unit employing the handlers and animals. If pack animals are procured from native sources, provision must be made for carrying animal feed because there is little feed, but plenty of forage, for animals in the jungle. This will, of course, lessen the pay load of rations, ammunition, and equipment that the animals could carry.
- (3) *Wheeled and tracked vehicles.* Use of wheeled and tracked vehicles is generally impracticable, except on roads and on wide trails during the dry season. Engineer and pioneer troops may not be able to improve trails to permit movement of ¼ ton trucks and trailers in areas close to the combat echelon. To the rifle company commander this means loss of vehicular mounted radios and recoilless rifles. The need for the recoilless rifle is offset by the difficulty of movement for hostile armor. To achieve maximum efficiency in the use of vehicles it may be necessary to establish transfer points for loads; that is, large vehicles might move supplies as far forward as possible and then supplies are transloaded to smaller, lighter vehicles, which in turn could move supplies as far forward as practicable. Pack animal carrying parties then could move the sup-



Figure 136. Large village located on a valley floor in jungle.

plies to their destination as required. Armored personnel carriers have a definite potential in this scheme as they are useful for transporting supplies and evacuating men in areas dominated by flooded cultivations or in delta country where the only arteries of travel are canals.

- (4) *Travel by water.* Waterborne transportation is often the surest and most economical means of supply in the jungle. Water transportation should be used to the maximum extent practicable and distribution points should be established on waterways to save transportation by men, animals and vehicles. Tropical rivers are subject to rapid changes in depth and speed of flow due to rainfall variations. If water transportation is the principle means of supply and evacuation, the wet season

will prove to be operationally advantageous. A river that is normally ankle deep during the dry season may be several feet deep during the rainy season. Supply points should be high enough above the level of the waterway to prevent damage to supplies in the event of a flash flood.

- (a) *Native crafts.* Often the movement of military boats to forward units may be slow due to transportation difficulties. Therefore commanders should be alert to explore the possibilities of using native water craft. Native boats are tailor-made for the type of waterways encountered in the specific area where the boats are used.
- (b) *Rafts.* Another expedient is the use of rafts. Rafts are difficult to control, even in calm waters, and this difficulty is in-



Figure 137. Small village located on ridge line in secondary jungle.

creased many times in rapidly moving streams or rivers. Great care should be exercised in building rafts from jungle hardwoods as many of these woods will sink in water. If a wood chip from a tree does not float in the water then a raft made of that wood would not float either.

- (5) *Aircraft.* Jungle operations place a high premium on the use of aircraft for supply, evacuation, and movement of troops because of its speed, flexibility, and range. Army aviation is normally employed by attachment, support, or operational control. It is recommended that nondivisional aviation be employed under operational control below division level, with control becoming effective at the beginning of the execution phase of the operation.

- (a) *Landing areas.* Large swamps and areas covered by dense vegetation limit the number of landing areas. Airfields require considerable time and, usually, heavy equipment to prepare. Frequent rains necessitate surfacing with pierced steel or aluminum planking, crushed rock or coral. Rivers or lakes sometimes eliminate the need for airfields as Army aircraft can be equipped with floats or amphibious gear. Construction of rotary wing landing areas can ordinarily be performed with hand tools and explosives. Such construction can be simplified by using a portion of the felled trees to build a platform rather than completely clearing the ground. It is undesirable to require a helicopter to make a vertical ascent when it is heavily

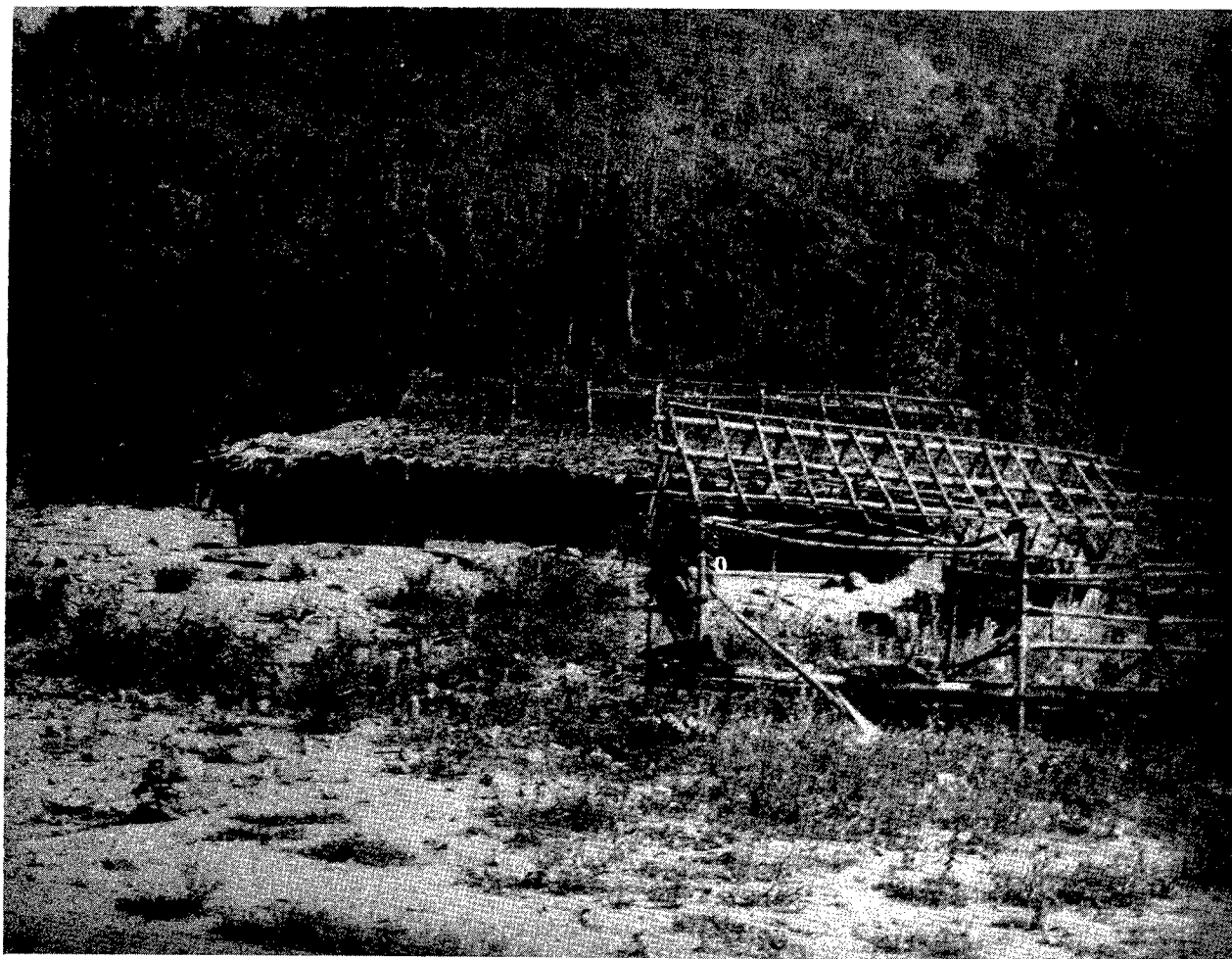


Figure 133. Typical large jungle village. Note diversified types of huts.

loaded since a large amount of power is required to climb vertically after take-off and, as a result, the allowable payload is decreased. Density of the air in extremely hot humid weather reduces aircraft performance and larger landing areas may be required (para 134).

- (b) *Air movement of supplies.* If permitted by the terrain and availability of landing areas, resupply by rotary wing aircraft is more efficient than drops from a fixed wing aircraft. Air drops by parachute, however, from fixed or rotary wing aircraft is advantageous in that it is a rapid means of delivery, requires minimum terminal facilities and makes deliveries to isolated units possible without further transmovement. The disadvantages lie in the dispersion of the

supplies, the requirement for specially trained personnel and special equipment, the lower supply payload of the aircraft due to the weight of parachutes, and the high percentage of hang-ups in the jungle canopy with consequent loss of cargoes. Another method which can be used to drop equipment is the free drop. There are a few types of equipment which can be dropped in this manner without damage, e.g., cartons of combat rations. Normally the special packaging required greatly limits this method of delivery; however, it does insure a minimum number of hang-ups in the canopy. Free drops are most effective when the drop can be made into a river, stream, or other body of water and the ground party can take immediate action to re-

cover the supplies. One method of delivering combat rations and water by free drop is to lash two cartons of rations securely together. Two five-gallon water cans, half filled with fresh water, can then be tied to the ration cartons (fig 134). This bundle can then be dropped from a low altitude into a stream, lake or river. Other disadvantages may be alleviated by the use of expedient parachutes. There are two types which can be made from standard, easily obtainable materials; these are the poncho expedient parachute and the shelter half expedient parachute. With little training, a unit can fabricate these improvised parachutes whenever necessary. The poncho chute may be used to drop up to 65 pounds of equipment and the shelter half expedient parachute can handle a maximum of 125 pounds. If the maximum payload is applied to either type of chute, breakage of sensitive equipment may occur due to the rapid rate of descent. Every jungle soldier should be equipped with a poncho and, because of its effectiveness, construction of the poncho parachute expedient will be described in detail below:

1. First, tie the hole in the center of the poncho so as to allow no air to escape.
2. Next, fold the poncho in half with the snaps down. Now affix the suspension lines, all of which are 6 feet in length, to each of the grommets on the poncho with a bowline knot.
3. Then, tie an overhand knot with the suspension lines over a snap link after insuring that all the suspension line ends are even.

4. To fold the canopy, lay the poncho out flat and, starting on both sides, make 6 to 8 inch S folds toward the center. Now, fold the narrow folded poncho into an M fold as shown below:
5. The static line has a loop in the end which attaches to the canopy. Using 25-pound test string, make one and a half loops connecting the loop on the static line and the string on the hold of the poncho. Tie with a square knot.
6. Attach the load to the parachute S, folding the suspension lines on top of the load and then place the M-folded "parachute" on top of the load. Affix with the 25-pound test string in the same manner as tying a package. Insure that the top of this tie goes through the loop in the static line. This will deploy the suspension lines prior to breaking loose from the aircraft.

48. Construction of Trails, Bridges and Roads

The lack of roads and bridging in jungle areas necessitates training in construction of expedient roads and bridges. Training should include classification of roads and bridging, the purpose and characteristics of each, and methods of construction. While not a usual infantry mission, circumstances may well dictate building of roads and bridges. Units moving deeply in the jungle will require this capability. The principles of construction are standard and are those used in any area. While training should not be designed to produce engineer experts, it should teach the basic principles of road and bridge construction for infantry units, including organic vehicles. For detailed information see FM 5-250.

CHAPTER 4

JUNGLE OPERATIONS

Section I. GENERAL CONSIDERATIONS

49. Principal Effects of Jungle on Operations

a. General. Standard and current combat principles must be applied to a jungle environment with emphasis placed on the modifications to these principles that are necessitated by the wet tropical conditions.

b. Operational Limitations. In jungle warfare forces may have to move rapidly from primary jungle through secondary growth to cultivations. This requires great flexibility in thought, planning, organization, equipment and tactics; it may require decentralization of command and control, for at times a unit may be located where control is easy—on other occasions, junior leaders may find themselves operating on their own initiative for long periods. The possibility of sudden enemy air or ground attack at any time must not be overlooked. The unit fighting in jungle has to operate within its own resources more often than in any other type of terrain. The jungle unit must be so balanced that it is capable of developing at any time an effective degree of mobility and firepower without support from higher echelons. This ability will largely be dependent upon the factors of communications, maintenance and discipline. The final effects, then, of the restrictions imposed by jungle on operations can be summarized as follows:

- (1) Forces must move on widely separated axes.
- (2) The amount of heavy equipment and supporting weapons that can be used is severely limited.
- (3) Control is difficult and must be decentralized.

- (4) Frontages must be shortened and intervals must be lessened in movement.
- (5) Numerous limited objectives must be assigned in an attack.
- (6) Maintaining direction of movement is difficult.
- (7) Silence and security measures increase in importance.

c. Tactical Use of the Ground. High ground in jungle operations is of tactical importance under the same conditions as in other types of warfare; namely, when it controls likely avenues of approach, or when it affords observation over a particular area. Undue emphasis should not be placed on high ground. Careful consideration must be given to high ground, however, in the following areas:

- (1) The junctions of primary jungle and secondary growth.
- (2) The junction of primary jungle and grasslands or cultivations.

50. Preparation for Combat

For jungle operations, a detailed standing operating procedure should be prepared by all units down to and including fire teams. The standing operating procedure should cover the organization of combat teams for reinforced rifle platoons to the combined arms task force of battalion size. This SOP may include supply procedures, bivouac and shelter preparation, march rate, and formations. As seasonal weather changes will affect operations, such deletions, substitutions and modifications of equipment and organization are made as required.

Section II. MOVEMENTS AND MARCHES

51. General

Movement in the jungle is calculated in terms of time rather than distance. In the early stages of a jungle campaign, road nets may be limited or non-existent and cross country movement is slow and difficult.

52. Support

The difficulty of movement and the weight of equipment, weapons, and supplies decrease the speed and effectiveness of the supporting arms and services. This forces the foot troops to reduce their speed accordingly. Tanks may be used against definitely located targets, where the terrain permits. Small tank units may be attached to infantry units for the reduction of enemy strong points.

53. Factors Affecting March Rate

a. For the general principles of foot marches, see FM 21-18.

b. The rate of march will depend on the type of jungle to be traversed, the availability of trails, and the formation and security elements to be employed. When calculating the rate of march, the march distance, number of obstacles to traverse and the physical condition of troops must also be assessed.

c. Commanders must be constantly on the alert to keep the rate of march and the length and number of rest periods in line with physical endurance of the men. Extreme temperatures make frequent halts almost mandatory. The heat and humidity are factors which will affect every march to an unpredictable extent. For detailed discussion on effects of heat see FM 21-11.

d. Animals accompanying a column of foot troops can be expected to slow the rate of march. Pack animals should not be kept loaded for more than 8 hours a day. They must be allowed sufficient time for care and feeding. On sustained marches, over a period of days, long noon breaks must be taken to allow time for unloading, rest and reloading of animals.

e. Providing for adequate security in dense jungle can also have a slowing effect on the rate of march. Allowance must be made for this as well as for time required to secure aircraft landing or drop areas along the route.

54. March Discipline

a. March discipline is made difficult by the problems of control. Dense vegetation, which greatly restricts mobility and observation, presents a serious obstacle to effective control of any type of movement through jungle.

d. Difficulties of control due to lack of direct observation of the major portion of the march column must be offset by reduced distances and intervals between individuals and units, and added responsibility on the part of junior leaders. Definite march objectives must be assigned and each unit leader must be acquainted with the complete march plan. Although control is more difficult when moving a unit by two parallel, yet separated columns, speed and execution of march is facilitated. This formation keeps the unit more compact and better deployed for action than a single, strung-out column.

c. To minimize the control problem, all men should observe the following rules of conduct:

- (1) Prescribed distances and intervals must be rigidly maintained to prevent loss of contact and to prevent the column from bunching up.
- (2) At halts, the men relax physically but they can never afford to completely relax mentally. The men must be kept alert by the constant checking by all leaders. Security posts will be maintained at all halts.

d. The company commander should march well forward in the column where he can control the movement and any tactical employment required.

55. Selection of Routes

a. The selection of usable routes is a difficult job. Select a route that presents the least amount of obstacles and plan the route in a series of legs from one march objective to the next. Security of the route must also be considered. If there are no favorable terrain features, such as ridge lines, etc., a straight line route is the best, deviating only for any major obstacles.

b. Maps of jungle terrain are often inaccurate and cannot be depended on for anything but information on the most outstanding terrain features (para 32b).

c. Aerial photographs will seldom show trails in the dense growth, but aerial reconnaissance and photographs will often show outstanding features of terrain which can aid in evaluation and orientation. Helicopter scouting parties can be used to advantage in route reconnaissance. For a detailed discussion of aerial reconnaissance, see FM 1-100.

d. Normally, trails will exist between native villages, even though none appear on available maps. When enemy contact is not imminent and speed of movement is important these existing trails as well as stream beds should be used. Streams may be used as trails if not too deep or swift, and a deep stream is one of the fastest and most dependable means of jungle travel when rafts or small boats are available.

56. Selection of March Objectives

a. March objectives should be terrain features recognizable on the map as well as on the ground.

b. March objectives should be carefully selected from the map prior to starting the march, and they should be planned so the unit can move from one objective to the next in a prescribed period of time. This aids navigation and control by establishing a series of check points. These objectives may also be used as rallying points. A march objective selected for a halt must lend itself to the defense. An area considered for an overnight halt must be chosen with particular care and it should lend itself to an all-around (perimeter) defense.

57. Night Marches

Since night movement in the jungle is affected by the dense vegetation and the complete darkness, individuals must be trained to operate off the trail as well as on the trail. Night movement is characterized by slow and deliberate progress and requires

detailed planning. See paragraph 38 for a discussion of control measures to employ during night movements.

58. March Security

a. Security measures employed in normal operations remain essentially the same in jungle operations except that distances between contact elements are reduced, and the measures are more intensified, due to reduced visibility. If a unit is operating independently, all-around security is mandatory.

b. Flank security in the jungle must be continuous. In dense growth, security elements must cut their own trails, and often cannot maintain a uniform rate of speed. When this is the case, they must be rotated frequently to avoid fatigue which may cause a letdown in the mental alertness of the men. The speed of a column is greatly reduced by the frequent changing of security elements. If flank security elements cannot be used, due to the terrain or dense vegetation, individuals must be given specific directions of surveillance to cover those areas not otherwise covered. When crossing obstacles or danger areas, flank security patrols must be used to cover the crossing. The patrols will then rejoin the last march unit after completion of the crossing.

c. During halts, the units move off the trail. Security elements are sent out in all directions not only to observe but to listen for enemy activity as well. At least fifty percent of the unit must be kept alert even during breaks. Due to the possibility of an enemy attack from any direction, halts should be ordered only when a large portion of the column is on terrain that lends itself to an all-around defense. Halts for overnight bivouacs should be made with sufficient daylight remaining to adequately secure the bivouac with a perimeter defense formation before darkness.

Section III. COMBAT INTELLIGENCE

59. General

a. The operational techniques used in the production of combat intelligence in jungle warfare are consistent with established procedures. In the collection effort, extensive patrolling action will be necessary due to limitation of other sources normally available to the intelligence officer.

b. Map coverage of jungle areas is limited. Due to the inaccuracies in the available maps, care must

be taken to insure that the most current map available is used.

60. Weather

a. Weather forecasts will be reliable in jungle areas due to the more apparent division between the two predominant seasons—dry and rainy, except in areas of equatorial jungle where there are no dry seasons. During rainy seasons, rainfall can be pre-

dicted with reasonable accuracy. The volume of rainfall is the most important factor. Two hundred inches of rain are not uncommon in a year. During dry seasons, it is not unusual for two or more months to pass with no precipitation whatsoever.

b. Visibility may be greatly restricted during rainy seasons, due not only to the rainfall itself, but also to heavy ground fogs which may linger for several hours after sunrise. Light data which could be used in drier climates is of less value under such circumstances.

c. Absence of wind in areas of dense forest or undergrowth will have a marked effect on the employment of smoke. High winds may not be felt in heavily vegetated areas since they tend to pass above the dense forest.

d. Temperature changes in mountainous jungle areas will sometimes range 40° to 50° over a period of 12 hours. In other jungle areas the deviation from day to night will be constant and have very little change.

e. Trafficability varies with the location of the jungle area. Near large bodies of water, low ground may be constantly soft, even in the dry season, and may, therefore, be passable without improvement only to foot troops. Conversely, at higher elevations, trafficability may remain excellent throughout most of the year, becoming poor only during the worst part of the rainy season. At times, even when trafficability has been excellent, the volume of rainfall within an hour or less may completely halt vehicular movement and severely restrict foot movement.

61. Terrain Considerations

a. *Key Terrain.* Key terrain in jungle areas includes trails, roads, bridges, and communication centers. High ground is still selected as key but for varying reasons. A hill may be the only feature in the area which affords an area for defense. A river through an otherwise impenetrable forest may be a key terrain feature.

b. *Observation and Fields of Fire.* In dense jungle, observation and fields of fire are limited by the undergrowth. In the other rain forests, however, although good observation into the forest from the outside or above may be nonexistent, it is possible to have fair observation and good fields of fire for

a reasonable distance at ground level. This condition exists where the branches of tall trees interlace to form a canopy through which few sunrays penetrate, thereby prohibiting the growth of grass, bushes, or other foliage. Where old forests have burned or have been destroyed, the resulting tangle or undergrowth seriously limits both observation and fields of fire. In open areas, observation and fields of fire may be limited by the height of the jungle grass, which sometimes grows several feet over a man's head.

c. *Cover and Concealment.* Undergrowth, forest area, and high grass areas afford excellent concealment from observation and also limit the distance sound travels. It must be remembered that these advantages work for the enemy as well as for our forces. Artificial concealment and camouflage is very easy to make. Soft ground in certain areas and the prevalence of revetting and covering material make artificial cover easy to dig and conceal.

d. *Obstacles.* Many natural obstacles exist within the various types of jungle area. In the older forests there is generally no obstacle to foot movement other than incidental swampy areas and occasional fallen trees and vines. However, the trees themselves, depending on their spacing, and the moist ground, may act as obstacles to vehicular movement. Man made obstacles are often more effective in jungle areas than in normal terrain, due to the limited communication routes. A log barrier across a trail or a protected mine field across a road may cause a marked increase in the delay to the opposing force and may require a greater amount of effort for its removal or the preparation of a bypass.

e. *Avenues of Approach.* Suitable routes, considering the aspects of good observation, field of fire, use of key terrain, cover and avoiding obstacles, may be virtually impossible to find. A compromise must be made because of the limited existing routes. Cutting of new trails and repair of those already in existence are constant tasks. In selection of avenues of approach available to the enemy, the S2 should consider no portion of the jungle area as impassable, no matter how difficult or thick.

62. Consideration of the Enemy Capabilities

The intelligence officer must be cautious not to conclude that the enemy cannot attack through supposedly impenetrable areas or that he cannot

reinforce in time to affect our mission. Movement from friendly positions to an objective may take longer than estimated, and the enemy may take advantage of this to reinforce with a unit considered

too far away to be used logically for that purpose. Due to poor observation from both ground and air, the location of enemy forces is often quite difficult to determine.

Section IV. OFFENSIVE COMBAT

63. General

a. Jungle operations lack the unity characteristic of offensive operations in more navigable terrain. The operations become a series of decentralized small unit engagements. Subordinate unit commanders must exercise initiative and be allowed freedom of action in executing a mission.

b. Forms of offensive maneuvers in the jungle are normally restricted to envelopments and frontal attacks. Envelopments are executed where possible, often in conjunction with frontal attacks, to minimize enemy attention to enveloping forces. Air-mobile attacking forces (especially those using helicopters) are useful in executing envelopments in the form of surprise attacks and flanking maneuvers. Infiltration tactics and techniques take on increased emphasis for opposing forces because of the visibility restrictions imposed by jungle vegetation. For further tactical considerations in ground and airborne maneuvers, see FM 7-11, FM 7-40, and FM 100-5.

64. Movement To Contact

a. *General.* In jungle the great variety of terrain will enable the enemy to establish, maintain and withdraw from delaying positions sited in depth along the axis of advance of friendly forces without observation. These positions can impose serious and costly delays all out of proportion to their size unless advancing troops cut them off and destroy them. Leading infantry elements must maintain the momentum of the advance. This can best be done by fixing the enemy at the point of contact while maneuver elements seek limits of the flanks and the depth of the hostile position. This action is usually assisted only by the fire power immediately available and applies the principles previously described as "contact drills" or "immediate action" drills. Such small unit actions, carried out with determination, will usually disrupt the enemy's delaying tactics, retain the initiative and allow the main body to close with the enemy.

b. *Missions of Advancing Forces.* Troop movements will primarily be either—

- (1) Movement to contact an enemy force in a planned attack, or,
- (2) The pursuit of a defeated enemy. To exploit such a success in jungle combat commanders may be expected to run many more risks than would ordinarily be tolerated.

c. *Principles Governing Troop Advances.*

- (1) *Movement to contact.* The movement to contact is often restricted to a file, even for large sized units, unless trails are cut. Flank protection for moving columns is difficult and security forces work at greatly reduced distances. The rate of march is governed by the nature of the terrain and vegetation. In the jungle, time factors will be increased and space factors decreased. The commander places his supporting weapons well forward. When the position of the enemy has been determined and contact is imminent, the final stage of the movement is made. The advance is by bounds, from one terrain feature to another. Skirmish lines are rarely used by leading elements until contact is made.
- (2) *Pursuit.* The success of the pursuit in jungle is dependent on maintaining contact, either physically or by short distances. The pursuit must observe more than normal precautions to avoid moving into an ambush. This tends to slow pursuit down.
- (3) *Influencing factors.* The following factors influence advance or pursuit movements in jungle.
 - (a) The mission must be clear, understood, and kept in view by all members of a unit.
 - (b) The pursuing force must be well balanced.

- (c) The plan must be simple. It is useless to formulate a complicated plan which in the heat of action is liable to be forgotten.
- (d) Accurate and immediate information about the terrain is required at all levels. Maps and aerial photographs must be studied carefully before the operation begins. Frequently these will be the only sources of information from which to plan. Some topographical information may be obtained from local inhabitants, but this should not be accepted without reservation.
- (e) Constant pressure must be applied and maintained against the enemy to prevent him from reorganizing.
- (f) Leading troop elements must be prepared to outflank and bypass enemy positions. This demands a high degree of initiative, rapid and accurate estimates of the situation, clear, brief orders and resolute execution.
- (g) Commanders should position themselves well forward and, while not interfering with their subordinates, should be prepared to use all their means to maintain the momentum of the advance.
- (h) Fire power should be placed well forward and readily available.
- (i) Accurate and rapid dissemination of information and instructions; this, of course, is dependent upon an efficient communications system.
- (j) Speed, boldness and a willingness of platoon leaders and commanders to take calculated risks.

d. Planning. Detailed planning should consider—

- (1) The general shape of the ground.
- (2) Likely ambush sites. Long and especially steep, straight stretches of trail networks, bends in trails particularly on crests, small open areas, creek and river crossings, timber edges, trails cut or worn into hillsides and grassland growths should be carefully marked on the map and considered as danger areas.
- (3) Likely enemy outpost or observation positions. Knolls, the ends of ridge lines along which the axis of advance passes, vari-

ations in the vegetation patterns which give fields of fire to the enemy and trail junctions should be noted and avoided.

- (4) Any marked variation in terrain or vegetation likely to require a change in formation, such as the transition from jungle to village areas, swamps, grasslands and cultivations should be noted and plans formulated accordingly.

e. Formations. The close country of primary jungle or secondary growth rarely allows an advance in any formation other than a column. Such a platoon or company formation is more difficult to control under these circumstances, and they may require greater time than normal to deploy. In order to speed up deployment from column in close jungle country units should develop SOP or immediate action responses. If a squad is used as the point during the advance distances between men may average five to seven paces but troops must retain eye contact. If a platoon is used this same spacing should be continued throughout the platoon so that the overall length of the point platoon approximates 250 meters in length. The main body may use one or both sides of the path made by the point and the interval between men should be reduced to three paces. If the main body is the remainder of a company its over-all length would be approximately 400 to 500 meters. Such a formation is suitable for movement through primary jungle, along trails, through swamp forests and grasslands. In plantation with regular rows of trees it would be vulnerable to machinegun fire. On passing into paddy fields, villages and open swamps the formation should be opened up as enemy observation is increased. The commander of the point should receive instructions as to the method of dealing with any unexpected changes of topography; i.e., whether to outflank and then search back, or whether to alter the formation and pass through.

f. Security. The generally extensive fields of view and fire in open areas diminish to 5 to 10 meters in secondary growth and about 100 to 200 meters in plantations. This should not be taken to mean that ambush is unlikely in open areas, since guerrillas have shown that quite large forces can be ambushed in open plains; rather it must be assumed that although the danger from ambush is increased in close country danger still will exist in open areas.

Troops must be prepared during the advance to deal with contact on the flanks just as effectively as contact from the front. In addition, no column should be so disposed that the whole of it can be ambushed at one time. On the other hand it must never be allowed to become too long or troops allowed to straggle. For brief halts local security is obtained by having troops face outwards from the path of movement and by taking up firing positions just away from it. For longer halts, as at meal times, squads and platoons should form an all-around defense. Security measures should be standard drill and executed without orders during halts.

65. The Attack

a. *General.* Attacks in the jungle are usually launched during daylight. Night attacks are seldom launched unless there has been time for adequate thorough reconnaissance and detailed simple planning, there are adequate easily recognizable control measures available, secrecy can be maintained, and the condition and training of the troops favors such a course of action. However, the jungle daylight attack resembles a night attack because of reduced visibility, control, and effectiveness of aimed small arms fire.

b. *Forms of the Attack.* Attacks in jungle terrain may take form in two ways—a piecemeal attack and a coordinated attack.

(1) *Piecemeal attack.* These engagements occur when forces first approach one another or after a breakthrough when one force has disengaged. The usual objective of a piecemeal attack is to break through enemy advance forces and to seize tactical terrain features. These actions will normally be limited to squad, platoon and company level; therefore, reliance must be placed on experience and combat proficiency of troops rather than on detailed planning and analysis of every possible contingency.

(2) *Coordinated attack.* Coordinated attacks are launched against strongly prepared enemy positions to break through the enemy defenses in order to allow commanders an opportunity to exploit the initial success and thus to achieve a final or at least a significant victory. Assaulting troops are

restricted in their scope of maneuver but this disadvantage is compensated for by the additional weight of fire support afforded by air support, armor, artillery and, in some cases, naval gunfire. The coordinated attack is rarely planned below battalion level.

c. *Basic Requirements.* The criteria for a successful attack in jungle does not materially differ from that as described in FM 7-40 and FM 100-5 and as applied to attacks in more open terrain. However, due to the difficulty of planning for and launching of an attack in jungle it is well to review the basic requirements for successful attack. They are:

- (1) The attack must be organized in depth.
- (2) The line of departure must be secure.
- (3) The attack must be supported by all available fires.
- (4) Assaulting infantry and tanks (if present) must keep close to supporting fires.
- (5) The momentum of the attack must be maintained.
- (6) Reorganization after the attack must be rapid and complete.
- (7) Supporting weapons must displace forward quickly to assist reorganization.
- (8) Areas immediately adjacent to the objective must be dominated after the attack.
- (9) Air defense measures should be established.

d. *Planning.* The plan of attack includes the scheme of maneuver and plan for fire support. In the jungle, attack plans may include as required the seizure of a communication complex, a resupply base, critical port facilities, navigable routes through an otherwise impenetrable jungle, an inland navigable waterway, commanding terrain, and enemy forces. For detailed planning in offensive combat, see FM 7-11 and FM 7-40.

- (1) *Troop leading procedure.* When he receives his orders to attack, a commander commences his troop leading procedure. Each of the troop leading steps is accomplished but the time spent on each depends on the time available and the time until H-hour. On occasions planning for an attack in jungle may occupy days; on others, the commander may have only a

few hours to plan and launch his attack. Unit SOP must provide for all main contingencies.

- (2) *Reconnaissance.* Information on the location and strength of the enemy and the ground can best be obtained by reconnaissance and patrolling. It is usually not possible for a commander to get a good picture of the area over which he must attack by personal reconnaissance in dense jungle. Patrols will be the primary means of obtaining this information. Platoon leaders, squad leaders, and, in some instances, company commanders must be prepared to assault without first seeing the ground or the objective. A high standard of aerial photograph and map reading is therefore essential. Natural obstacles which the enemy has deemed secure and on which he has relied for protection can often be crossed by determined troops after thorough reconnaissance by patrols. Such ground is often lightly held or even completely undefended. In addition, there is a tendency for defenses to be concentrated on the more likely avenues of approach from the front and flanks. Consequently, when considering small defensive positions advantage can sometimes be taken of a surprise attack in the rear of a position where it may be least suspected and where there may be a lack of preparedness. If time is available the reconnaissance for an attack must be planned carefully. Emphasis should be placed on the following information:

- (a) Location of the enemy, particularly his flanks.
- (b) The depth of the position and the location of sentries and listening posts.
- (c) Location of automatic weapons and their sectors of fire.
- (d) Suitable assembly areas, attack positions, lines of departure and "dead" ground to enemy observation and fires.
- (e) Routes to assembly area.
- (f) Approaches to the objective.

e. Control of the Battle. Control of an attack in jungle depends upon the commander and his subordinate leaders having current information about the progress of the attack and having efficient

means to pass information on to all concerned. The commander increases his control of the situation by positioning himself so he can observe the action if terrain permits. Communications are the key to command control in the jungle attack. Good communications can be facilitated by establishing a headquarters on a reduced scale well forward before the attack starts. This headquarters should be sited in a position favoring radio equipment, in an inconspicuous position and in a position which affords a suitable command post close at hand. The commander should leave this CP only during the active phase of the battle when he considers that his presence will directly influence the outcome of the attack. In close jungle, he is better located centrally than where he may be out of contact.

f. Conduct of the Attack. Based on information obtained by reconnaissance, the commander decides on the direction of attack. The attack is conducted with a formation similar to that used in a night attack in open country. Distance and intervals are reduced and the column formation is maintained as far forward as possible. Fire support is as essential in the jungle as in open terrain. Unsupported infantry ordinarily cannot breach a defensive position without incurring heavy casualties. The area to be breached must be pinpointed. Artillery and mortar forward observers may have to approach within extremely short range of their own fires. The fire support coordination (FSCC) can control the priority of units to register with smoke shells or sound sensing. During the assault, supporting fires should continue until they are lifted or shifted by the assaulting commander. They are then shifted to cover the specific targets that will most assist the progress of the assaulting force. Because of terrain and visibility restriction, an assault line, as such, is not normally formed. Rather, aggressive fire and movement by assaulting fire teams are conducted to overcome enemy resistance. Due to the difficulty in locating enemy emplacements by visual means alone, the fire and movement phase of the assault may force the enemy to disclose his positions. As the enemy emplacements are located, the assaulting force generally move on a single axis with the fire concentrated on a selected and limited area of the enemy defensive perimeter. Smoke may be used to screen off the flanks of the area selected for penetration. The objective of the initial assault is to achieve a local penetration into the main battle

position of the enemy. Once the penetration is made it is exploited until the objective is taken. Fire support and maneuver may be replaced by assault fire after the penetration when friendly forces are fanning out within the enemy battle position,

if the terrain and situation permit. After the objective is overrun it must be secured immediately with a hasty perimeter, security measures set up and preparations made to repel an enemy counter-attack.

Section V. RELATED OFFENSIVE AND DEFENSIVE ACTION

66. Coordinated Attack Against a Fortified Position

a. When attacking a fortified position, manmade obstacles such as heavy bunkers, protective and tactical wire, and mines will be encountered. The enemy will have to be burned or blasted out of his positions. This will require a great amount of firepower and frontages must be narrowed to insure the concentration of these fires. Limited objectives must also be established to facilitate control.

b. The preparatory phase of such attacks will involve the construction and improvement of roads and trails behind friendly lines to permit the movement of supplies, ammunition, and the weapons that are to be used to support the attack.

c. If naval gunfire can be used to advantage, it should be requested and a schedule of the fires planned in advance. A naval gunfire liaison team may assist in directing the gunfire by direct ship-to-shore communications.

d. Arrangements should be made for maximum artillery preparation and continuing artillery support. The artillery may require several days for displacement to new and better positions and registration.

e. Forward air controllers make ground reconnaissance, employing all possible means to locate accurately the targets for preparatory bombing and strafing attack.

f. The procurement of combat intelligence means of air-photo reconnaissance, interrogation of prisoners and reconnaissance patrolling is essential.

g. Combat patrolling must be continuous and aggressive keeping the enemy on the defensive and limiting his ability to patrol.

67. Observation Posts

The terrain and the resulting poor visibility limit the value of observation posts. In jungle the observation-listening post is the most frequently used. When observation-listening posts are used

it is necessary to have overlapping fields of vision and hearing. Individual soldiers in front line positions must be trained to observe, listen, and report accurately on enemy activity.

68. Patrolling

a. For the principles of patrolling and the detailed instructions concerning the operations of patrols, see FM 21-75, FM 21-50 and paragraph 40 of this manual.

b. The size of a patrol varies with each mission assigned and should include only the number of men necessary to complete the mission successfully. The larger patrols are used primarily to establish patrol bases from which smaller patrols operate (para 82).

69. Relief in Place

a. The execution of reliefs in forward areas is one of the most common operations of warfare in any type of terrain. Although jungle operations will usually be conducted by small units acting independently the possibility of combat on a vast scale over protracted periods cannot be ignored. Most certainly in such cases reliefs will be necessary. Reliefs are carried out in open country at night when observation of the enemy is of prime concern. In jungle, reliefs should take place by day, where natural security from observation is provided and control of troops is possible. Regardless of where or when reliefs take place, in order to avoid confusion it is essential to have a simple procedure which is known to all. The unit operational SOP must include procedures and instructions for relief operations.

b. *Planning.* The battalion commander should issue a warning order 48 hours before a company is required to effect a relief. On receipt of a warning order the company commander should pass on all available information to his unit leaders and detail an advance party. The advance party should consist of the commander or executive officer, a

unit supply member, platoon leaders or platoon sergeants and a messenger from each platoon; the commander or his representative and two runners.

- (1) *Duties of the advance party.* Rifle company commanders and platoon leaders must be furnished information on:
 - (a) Terrain, including details of dead ground.
 - (b) The enemy (habits, snipers, patrols, location of automatic positions, minefields, wire, shelling, etc.).
 - (c) The air situation, if not already obvious.
 - (d) Disposition of adjacent units.
 - (e) Mission of company or platoon to be relieved.
 - (f) Complete overlay of company or platoon position to include number of men in each listening post, observation post, and special warning devices.
 - (g) Counterattack plans.
 - (h) Fire plans.
 - (i) Methods of calling for fire support.
 - (j) Other operations in the area.
 - (k) Alternate and supplementary positions.
 - (l) Patrol routes and minefield or obstacle lanes.
 - (m) Alert signals.
 - (n) Supply points.
 - (o) Feeding and sanitary arrangements.
 - (p) Details of any dead and equipment lying forward of the position.
 - (q) Location of higher headquarters CP.
 - (r) Routes for runners.
 - (s) Passwords, challenges, and other codes.
 - (t) Light signals.
 - (u) When responsibility for the area is to change between the two commanders.

c. *Procedures.* Control of movement in and out of two units is the responsibility of the outgoing or relieved unit. The following will be arranged:

- (1) Selection and marking of routes.
- (2) Designation of guides to meet and lead incoming troops to checkpoints.
- (3) Establishment of necessary checkpoints to effect both in and out movement.

d. *Security During Relief.* The outgoing unit is responsible for maintaining an illusion of normal activity during the relief. Normal patrol activity should be maintained prior to and after the relief. Patrols should be dispatched to insure that the area is well covered during the actual time taken for the new company to move in and the old company to move out. These patrols may include representatives from the advance party of the incoming unit. Patrols are only withdrawn after the relief, and the relieving units must know where to direct them on their withdrawal.

e. *Speed and Secrecy in Relief.*

- (1) *Speed.* It is essential that the relief be speedily effected and troops quickly settled into their new routine. Adequate planning and training is necessary to minimize confusion in a relief.
- (2) *Secrecy.* The relief must be carried out by silent movement sometimes in complete darkness. Noise will make the enemy suspicious and may lead to an attack during relief; at any rate, it will certainly draw fire. On the other hand complete silence and no apparent activity may make the enemy equally suspicious; hence the need for maintaining normal activities.

Section VI. THE DEFENSE

70. General

a. Defensive combat in jungle terrain does not differ greatly from combat in other types of terrain. The basic principles and fundamentals of defense remain valid. However, the tactics and techniques used to apply them varies depending on the nature of the terrain. See FM 7-15, FM 7-20, FM 7-30, FM 61-100 and FM 100-5 for principles, fundamentals and doctrine governing defensive combat.

The extent to which a defensive position is developed requires an understanding of jungle characteristics. There are no impenetrable jungles, impassable swamps, unfordable rivers, or unscalable cliffs and the commander must not assume that his command is protected by such barriers. Because of the heavy vegetation and dense undergrowth, observation and fields of fire are restricted. Commanders at all levels must make a thorough terrain analysis of any area they are to defend. The de-

gree to which a defensive position is prepared depends on the mission, enemy, terrain, and troops available; on the availability of logistical support; and on the requirements of time and space. Thorough and continuous ground reconnaissance is necessary because of the limited effectiveness of security elements. The concealment from air observation afforded by the jungle helps to permit extensive ground reconnaissance. Dense jungle imposes severe limitations on the defensive use of weapons because observation is often limited to a few yards. These factors along with restriction on maneuver and control, place the greatest emphasis on planning, coordination, and small unit leadership.

b. Of the many problems peculiar to defense in jungle terrain, the most critical is communication. Whenever possible, alternate means using wire, flares, and other signal devices must be employed. The perimeter type defense will most frequently be employed, however, it is highly desirable to organize in depth and retain a mobile reserve whenever possible. The use of helicopters will enable a commander to conduct mobile defense operations in an area otherwise unsuitable.

71. Basic Considerations

a. *Enemy Tactics.* The purpose of any enemy attack will be to launch sufficient strength in manpower, equipment and firepower against a selected weak point in a defensive position; the immediate aim is to penetrate the defense and to achieve the isolation of defensive positions for subsequent envelopment when they are no longer mutually supporting.

b. *Morale.* Rumors and fear of the jungle must be suppressed and, within security requirements, troops kept informed. Forceful leadership, strict discipline, prompt evacuation of casualties, and prior planning will minimize the morale problems inherent in a jungle operation.

- (1) The unit completely dominates the local position and the enemy by well-prepared and executed patrols and small attacks. This will maintain the offensive spirit.
- (2) Troops are rested as required. Normal routine under jungle conditions such as patrols, sentry duty, digging, etc., can be physically exhausting and mentally depressing.

- (3) Troops are kept healthy. Fungus infections, insect bites, skin rash and immersion foot can deteriorate troop health rapidly unless treated promptly and properly.
- (4) All available comfort items (candy, tobacco, newspapers, etc.) should be equitably issued and recreation should be provided as available or possible.

c. *Climate.* When planning or conducting the defense the following factors should be considered:

- (1) There are about twelve hours of daylight in jungle followed by extreme darkness under the canopy. Digging in darkness will be difficult to conceal because of noise created by cutting through roots and other forms of vegetation.
- (2) Climate, primarily humidity, will adversely affect physical effort.
- (3) Tropical downpours will quickly flood positions unless they are adequately drained. This should be considered when siting positions.
- (4) Reserve ammunition and other supplies must be protected from rain. All supplies should be placed on dunnage to keep them out of the mud.

d. *Requirements for Defensive Positions in Jungle.*

- (1) *Depth.* The defensive plan must include depth in order to—
 - (a) Deny the enemy ground and air observation and reconnaissance of the entire area.
 - (b) Break up the enemy attack by attrition.
 - (c) Afford time for the commander to analyze the situation, determine the enemy's intention and take action accordingly.
- (2) *Concealment.* The employment of undetected reserves and concealment of all positions are the main opportunities which the defense has of achieving surprise and gaining the initiative. Jungle provides good natural concealment from ground and aerial observation. Troops should preserve the natural look of the jungle by carefully disposing of refuse and spoil, by good trail discipline, by restricting cutting of timber near positions and minimum movement to minimize the effectiveness of enemy reconnaissance. It must be

expected that the enemy will use every ruse to gain information about positions. Enemy forces will be able to approach very close in these attempts particularly at night. Troops must be fully aware of these conditions. In open terrain such as grasslands and cultivation it may be possible to occupy reserve slopes. Requirements for such positions are adequate fields of fire for automatic weapons and observation from the flanks into the enemy side of the positions.

- (3) *Mutual support.* In primary and secondary jungle the short range of observation, short fields of fire and the restricted range of automatic fire coverage will require that defensive positions are closely sited for mutual support. However, care must be exercised in this close siting of positions so that adjoining positions are not placed so close together that they are vulnerable to high angle fire after the foliage and scrub have been shot away.
- (4) *All-around defense.* Penetration between defensive locations may occur due to the extreme difficulty of covering ground with men and fire in jungle terrain. Thus, the principle of all around defense should always be applied. A defensive position should not, however, depend solely on another position for protection of its flanks and rear.
- (5) *Controlled fire power.* In dense vegetation, elements of a unit are less able to rely on effective mutual support fire from adjacent positions. It is thus most important that adequate fire support under centralized control be made available to any unit or element on position to assist in breaking up mass assaults directed at one point. Good fire discipline, effective control by junior leaders and correct reaction by troops will be vital in fighting off a sudden assault from close range. The maximum fire power must be applied at the critical moment and at the shortest possible range to be effective against a massed assault. Targets should not be ordinarily engaged unless the enemy is definitely identified. This is most important in the defense at night.

- (6) *Counterattack.* There must be a counter-attack plan and troops designated for this purpose for all units. These troops should be familiar with the plans. Rehearsals are extremely important.
- (7) *Obstacles.* Obstacles should be covered by fire. The enemy should be denied observation of them. They should not be located within grenade throwing range of the defensive positions. This must be balanced against the thickness of the vegetation and the possibility of the vegetation being destroyed. For instance, a wire obstacle located ten yards outside the position may be sufficient to prevent grenades being thrown in if the growth is dense, but it would probably not suffice after the growth has been shot away.
- (8) *Communications.* Ground lines are susceptible to enemy compromise or interference in jungle. While it is likely that wire will be the primary method of communication in the defense there should be an alternate means. Signals should provide for a means to call for final protective fires and counterattacks.

72. Organization of the Ground

The principle of perimeter defense is usually used. The limited fields of observation allow the enemy to approach the position without being detected. Infiltration is easier and there is greater danger of attack from any direction. The proper use of listening posts and warning devices can reduce this hazard to a minimum. The battalion and smaller units often operate as independent units. The extent of all-around defense signals depends on the type of operation, the unit involved, the terrain and the vegetation. When possible, one or both flanks should rest on a natural obstacle such as a river, lagoon, swamp, steep cliff, or the sea. While such features constitute obstacles to the attacker, they are never considered as insurmountable barriers and provisions must be made to meet with fire the enemy who attacks over or through them. The first step in organizing the ground is to place the automatic weapons and prepare the fields (tunnels) of fire. Primary and alternate positions are constructed. Camouflage is continuous and strict camouflage discipline is observed. Vegetation is not cut unnecessarily and the cutting is carefully planned and controlled by leaders.

73. Security and Surveillance Measures

Security is planned to gain early information of the enemy's approach. Patrols, sentinels, observation posts, listening posts, and combat outguards are used. These outguards form the nucleus of the combat outpost system along critical jungle approaches. They give early warning of the enemy and, within their capability, delay, disorganize, and deceive the enemy as to the true location of the main positions. Trip wires connected to rattlers, anti-personnel mines, or illuminating flares may be installed around the position at night to warn of the enemy's approach. Other means may be used to illuminate the battle fields at night; cans filled with jellied gasoline with a remote system of ignition may be placed in strategic areas and ignited when the enemy approaches. Such devices should be located far enough beyond the position so that the light will not blind the defenders or disclose their positions, yet close enough not to be obscured by the vegetation. The effect of all illumination is limited by the heavy foliage and the tree top canopy of the jungle. Additional means to provide surveillance include radar and infrared devices. Detailed planning and coordination must be effected by all commanders sending out night patrols. Plans include the mission, time of departure, time of return, routes to be used, sign and countersign, and emergency signals. Patrols' plans are sent to the next higher headquarters and to the direct support artillery headquarters for coordination with adjacent units and security elements forward of the main battle positions, and with supporting artillery fires.

74. Conduct of the Defense

a. *Routine.* Morale, health and efficiency are best maintained in a company defensive position if a daily routine is planned and followed carefully. This routine will require daily visits by the commander to platoon positions to check on regular maintenance of weapons, equipment and protection of ammunition. (See chapter 7 for a discussion of maintenance procedures.) In turn, the platoon leader should check in detail at least one squad daily to practice the routine. The routine should cover—

- (1) *Alerts.* Unless positions are visited during alerts the battle readiness of the squads will deteriorate. Apart from being favor-

able times for the enemy to attack this provides a good opportunity for the platoon leader to consider the value of his fire plans under varying light and weather conditions.

- (2) *Meals.* Due to risk of enemy interference mealtimes should be staggered so that only one-third of the unit eats at one time. Cooking should be done at battalion or company level and distributed to the platoons.
- (3) *Working periods.* Rotation of tasks by platoons and squads.
- (4) *Washing.* Periods staggered.
- (5) *Rest.* Periods staggered as for meals.
- (6) *Reports.* To company commander from platoons according to schedule. These reports should be accurate and in detail and should include strength, changes in positions, platoon activities, enemy activities observed, etc.
- (7) *Medical precautions.* This should include personal hygiene, antimalaria, antimites medication, water discipline, latrine procedures and refuse disposal.
- (8) *Weapons maintenance.* A specific time for inspections should be set (and staggered by squads). In any one squad all automatic weapons should not be cleaned at the same time. Magazines should be stripped and, together with ammunition, wiped daily. Normally, field cleaning will be necessary on a daily basis to prevent rust damage from humidity.

b. *Procedures.* The defense is conducted according to the principles of standard doctrine. Long-range fires are planned and executed as in any other type of terrain, conforming to the desires of the commander and the availability of ammunition. Close defensive fires to include artillery, mortars and automatic weapons are planned to destroy the integrity of an enemy's forces before he launches his assault. Units whose defense areas are not under attack or whose weapons are not required to fire in support of areas which are under attack, discipline their fire to prevent disclosure of their positions. The decreased frontage, shorter distance, and closer intervals between units in jungle operations call for extensive and detailed planning for fires. Listening posts should use two-man foxholes be-

cause they allow the occupants to take turns at observing and listening and provide a two-man fighting unit. Individuals must be disciplined not to talk or smoke. Warning devices in the form of antipersonnel mines, booby traps, trip flares, vines, ration cans, and grenades should be installed. Plans

are made and movements are rehearsed for counterattacks to restore positions which might be penetrated by the enemy. If the counterattack force must pass through another friendly unit close coordination must be effected and movement must be rehearsed.

Section VII. RETROGRADE MOVEMENTS

75. General

As the tactical situation changes, a unit may receive orders to conduct a withdrawal from action to initiate offensive or defensive action elsewhere or be required to establish a delaying position in order to delay the enemy forward of a specific area for a specified period. In any type of retrograde movement it is absolutely necessary that commanders and leaders at all levels fully explain the reasons for such operations to troops and keep them fully informed of the situation. This is the only way to avoid rumors, maintain morale and to avoid loss of efficiency and the offensive spirit which might result during such operations.

76. Withdrawal

a. A withdrawal operation in jungle terrain when not under pressure, may be carried out in the same way as a night withdrawal in open country. Withdrawal by day in jungle in this manner is possible because of the concealment that is offered. It must be emphasized that the mechanics of such an operation may vary from those considered as doctrine. Daylight withdrawal techniques may have to be used in certain conditions.

b. Cover and concealment provided by the jungle facilitate withdrawal by units in contact with the enemy. Small groups familiar with the route over which they are to move can deny these trails to the enemy and force him to attack on a narrow front or make him cut trails around the delaying group. This delays the enemy long enough to allow the main body to withdraw. Withdrawal by daylight in jungle areas has many advantages of a night withdrawal in more open terrain, and it permits a greater degree of control. Maximum use of ambushes should be made.

77. Delaying Defense

In defense in jungle areas delaying action is executed principally on and near trails. In open areas, the action frequently requires the occupation and

defense of one or more delaying positions. The flanks of such delaying positions must be protected against envelopment by the enemy. Small, well-trained units can delay forces many times their size. This type of combat is especially strenuous; therefore, if the situation permits, units should be divided into groups which may alternate in occupying delaying positions and thus obtain rest, while the enemy is kept constantly engaged. Forward observers remain with the delaying force. In addition to their normal equipment, delaying groups should carry axes, mines, and explosives. In order to cause the maximum delay, particularly of vehicles, bridges should be destroyed and trees and other obstacles placed across all trails and roads as far forward from the delaying positions as time and the situation permit. Mines and booby traps should be placed in the jungle on both sides of the obstacles, and in the obstacles themselves to make their removal hazardous. At points where the jungle is thin and does not offer an obstacle to the movement of foot troops, mines and boobytraps may be employed to deny these avenues of approach to the enemy. Mines and boobytraps placed along trails and paths will cause the enemy to move with caution and delay his progress. Obstacles should be placed along the front of delaying positions in such a manner that the enemy movement will be canalized into areas where the delaying force can place the most fire power. Because of the difficulties of supply and coordination, small forces are better suited for executing delaying action in jungle. Reserves should be available behind leading elements along each trail for support and to patrol trails to prevent the delaying force from being cut off.

78. Employment of Chemicals in Retrograde Movements

a. *Persistent Effect Agents.* Chemical mines can assist in the withdrawal or delay by supplementing other barriers, obstacles, and demolitions. Specific areas recommended for the use of chemical mines

are demolition sites of bridges, approaches, and fordable crossing sites. The chemical mining of key trails, junction sites, or possible ambush areas will increase the number of enemy casualties. The commander can also use persistent effect toxic chemical agents to canalize the enemy into pre-selected areas or routes where other weapons can be used more effectively to cover the retrograde movement.

b. Nonpersistent Effect Agents.

- (1) *Vapor concentrations.* Nonpersistent effect toxic chemical agents can be used to disrupt the enemy's attack formations by causing quick casualties and forcing him to slow down or break contact with the friendly retrograde maneuver.
- (2) *Liquid concentrations.* The agents can be used for their liquid effect to create casualties by absorption through the clothing and skin.

c. Increased Communications Difficulties for Enemy Forces. Communication and control in the jungle will be difficult. By forcing the enemy to mask because of the presence of toxic chemical agents, commanders can increase this difficulty, increase the physical discomfort and decrease the enemy's ability to maintain contact with the friendly retrograde operations.

d. Troop Safety, No Restriction. Troop safety on the part of employing commanders will not be a major concern in the use of their persistent effect or nonpersistent effect toxic chemical agents in support of retrograde operations. Friendly forces will be moving away from the contamination. This plus the existence of reduced wind speeds (drag effect) and heavy foliage in jungle areas, add to the effectiveness of toxic chemical agents in jungle retrograde movements. Detailed discussions of agent characteristics and employment are found in FM's 3-5 and 20-32 and TM's 3-200 and 3-300.

CHAPTER 5

SPECIAL COMBAT TECHNIQUES

79. General

a. Military operations in jungle require many types of special operations. Patrolling actions, operations from forward bases, ambush and other forms of close combat are common. Thorough training in these relatively specialized operations is absolutely essential for the unit which must fight in jungle.

b. The jungle offers concealment and limits visibility to the extent that surprise in both the attack and the defense may be exploited to an unusual degree. Formations are compact and similar to those used in night operations in open or lightly wooded terrain. The development of initiative, boldness, and determination in the small unit commander and the development of self-reliance and reliability on the part of the individual soldier are required.

80. Raids

a. Jungle terrain lends itself to raid operations. The limited visibility and excellent concealment enable skilled raiding patrols to penetrate deep into territory controlled by the enemy. A platoon or smaller unit is best suited to raid type operations in jungle. Supporting fires may be used, if available, but the problem of fire control, the timing of operations and difficulties of communications, make the employment of fire support very difficult. The execution of a raid that will require a deep penetration into the jungle will be affected by the physical endurance required of the men to traverse the jungle terrain, the lack of detailed information of the enemy position, resupply, and evacuation. This can be minimized by establishing a patrol base near the general area of the final objective. From there, reconnaissance patrols can be dispatched to scout the enemy positions. Meanwhile, other members of the raiding force can be allowed to rest and prepare for the forthcoming action. Whenever possible and practicable, Army aircraft should be used to transport raiding patrol members into or near the gen-

eral area of the objective. This will enable the raiding patrol to reach their objective faster and in better physical condition to accomplish their mission. The limiting factors in the use of Army aircraft are landing areas, load capacity, and the possible loss of the element of surprise due to the noise of the aircraft.

b. For a discussion of the general principles governing conduct of raid operations see FM 21-50 and FM 21-75.

81. Ambush and Counterambush

For detailed discussion of these combat techniques see FM 21-50, FM 21-75, FM 31-16, FM 31-21, FM 31-22, and paragraphs 39 through 48 of this manual.

82. Tactical Base Operations

a. *Necessity.* Owing to the difficulties of supporting forces operating in jungle and because of the limited time that units can operate independently in this terrain it may be necessary to establish tactical bases to enable deep penetration of hostile territory.

b. *Tactical Bases.*

- (1) *Combat base.* A combat base is the focal point for all operations conducted in the area, sector, or subsector of operations. Generally, it is a semipermanent installation containing essential command, control, and combat service support elements of the unit and those attachments necessary to the performance of the mission. The combat base should provide an environment in which planning, coordination, and administration can be conducted in relative security. The combat base should satisfy the requirements for troop morale, rest, and rehabilitation with the provision of recreational facilities, baths, hot meals, and other such needs. Forces located in a combat base provide the reserves to be

employed to support forces operating from bases.

- (2) *Patrol base.* Patrol bases are temporary bases established by units engaged in operations away from the combat base. From these, search, raid, and offensive operations are conducted. The base is not protected by elaborate defenses and must retain a high degree of mobility. The size of a unit to operate from a patrol base is dependent upon the size of enemy units operating in an area. For further discussion of tactical base operations see FM 21-50, and FM 31-16.

83. Tracking

a. General. In jungle operations forces may have to hunt down small groups of guerrillas who are native to a particular area and know the terrain intimately. There is a requirement that troops be able to interpret signs left by the enemy and be able to track them. Particularly when patrolling, troops may encounter tracks which will disclose the presence of an enemy in the area and considerable information may be gained if the men, especially junior leaders, are able to "read" the signs correctly. It is most difficult to move in jungle without leaving some evidence on the ground. Even in the case of very small groups some signs are always present and noticeable to the trained eye.

b. Tracking Resources. To a unit operating in jungle there are three sources of trackers that are usually available. These are:

- (1) *Native trackers.* The availability of trackers from this source is subject to many variables. Attitude toward friendly forces, the language problem, reliability, ability and trustworthiness all enter into consideration when natives are to be used. Often natives will break and run at the first action and will constitute a threat to the security of a unit. Further, some of them may be bribed or coerced by guerrillas.
- (2) *Scout dogs.* Well trained scout dogs are useful in jungle operations. They may be used in patrolling, ambushing, sentry and guard duty.
- (3) *Troops.* All individuals can develop tracking ability. All men must realize that it is not necessary to become a highly trained,

narrowly specialized visual tracker to achieve an advantage over the enemy in this field.

c. Aids to Tracking. Some of the smaller signs which will disclose the presence or passage of the enemy are as follows:

- (1) Footprints or portions of footprints. It should be known what type of footwear the enemy is likely to be wearing so there will not be confusion with tracks made by friendly troops.
- (2) Direction of grass, leaves or sticks kicked up by feet. These will indicate the direction of movement by the enemy.
- (3) Unnatural formations of vines, dead grass, broken twigs, etc. will indicate that they have been pushed aside thus disturbing the natural appearance of the vegetation.
- (4) Sap, latex or fluid exuding from cuts or bruises on roots and trees. Some bark is easily broken when stepped on and sap may appear.
- (5) Disturbed dry leaf surfaces on the ground.
- (6) Change in color of vegetation. This occurs when foliage has been disturbed and the lighter underside of the leaves is turned up. This color will contrast sharply against the normal shiny surface. On the ground the color pattern of the leaves will be distinguished by the dark shadows cast by turned-up leaves and by the dark undersides contrasting with the brown color of the other dry leaves.
- (7) Dirt smudges on rocks, logs and leaves. Footgear will usually be wet and dirt will adhere to it, smudging and dropping off in fragments.
- (8) Water on certain areas whereas the remainder is dry. Water will usually collect in depressions made by footprints. If the general size and physical characteristics of the enemy are known the depth of such a print may give a good indication of the weight the man was carrying; the fact that dirt or mud tends to pile up around the outside of the print usually means that a man was running when he made the print.
- (9) Disturbances of insect life. Some insects, especially ants, follow a definite path in

movement and wear a most distinctive imprint through vegetation on the ground. If something violates this path (for instance, a footprint) ants will go around the interruption. Deviation from an established route by ants is a good indication that something has passed over that area.

d. Tracking Conditions in Jungle.

(1) Conditions favoring tracking procedures are:

- (a) Air and ground temperatures approximately equal.
- (b) A mild day with heavy moisture in the air with slow evaporation.
- (c) Damp ground and vegetation.
- (d) Ground overshadowed by trees.
- (e) Low wind speed.

(2) Factors which adversely affect tracking are:

- (a) Direct sunlight.
- (b) Strong winds.
- (c) Heavy rains.
- (d) Running water.

e. Enemy Deception. Well-trained enemy jungle troops may use any of the following methods to confuse trackers or to deceive patrols:

- (1) Walking backwards.
- (2) Walking in a stream.
- (3) Jumping off to one side of a route frequently.
- (4) Splitting up into small groups of twos or threes.
- (5) Walking along logs or on stones.
- (6) Moving through country, such as rocky terrain, over which it is difficult to track.
- (7) Covering footprints with leaves or brushing over tracks.

f. Counterdeception. The methods described above will delay the tracking process. No enemy is so skilled at woodcraft that he can completely cover his sign. A careful search of an area will show what method of deception has been used. Some measures to counter deceptive efforts are:

- (1) Analyze the direction of grass, twigs, ferns, etc. as these will always point in the direction of movement regardless of the fact that footprints appear to be going the other way.

(2) Search both banks of a stream at least 500 meters up and down from the point of entry.

(3) If it is apparent that the enemy has split up the point of separation should be marked. A decision based on study of available signs must be made as to which group will be followed.

(4) Examine any logs, stones, roots, etc. in the immediate vicinity.

(5) Examine the area on either side of path made by the enemy soldiers for signs of disturbance in the leaves.

g. Scout Dogs. Inasmuch as any visual tracker relies on sight he is unable to track at night and his efficiency is reduced by some types of vegetation or ground conditions. In these instances the scout dog becomes extremely valuable for tracking in jungle. The employment of infantry scout dogs is described in detail by FM 20-20. The intent here is to discuss only those aspects of jungle that can be expected to affect the dogs' tracking efficiency in the wet tropics.

(1) *Water.* As scent is soluble in water a dog's performance will be poor in heavy rain. Although a scent is constantly being produced its life is very short and the dog's range of air scent detection may be reduced to as little as five yards. Ground scent may be completely negated by rain.

(2) *Sunlight.* Direct sun light quickly destroys scent and this will severely limit the dog's efficiency under breaks in the canopy. However, as scent is constantly produced, and as air scent is not so affected, the dog will still have a reasonable range.

(3) *Vegetation.* Heavy undergrowth will restrict the spread of the air scent and will tend to blend with ground scent. Primary jungle and open ground or trails are ideal for dogs.

(4) *Wind.* Depending on the direction of the wind the scent may be considerably displaced from the target. The dog's average range of air scent of 200 meters in jungle may be doubled if down-wind of the enemy or considerably decreased if up-wind of the enemy.

- (5) *Heat exhaustion.* This condition is common in unfit dogs. The stricken dog becomes lethargic, refuses to work and attempts to keep in the shade. His temperature will rise rapidly up to 110° F. or more and he will appear extremely distressed. The dog should immediately be placed in the shade and cooled with water. It should be allowed to recover slowly.

84. Village Clearing

a. *General.* Most jungle villages are of two types (figs 136, 137, and 138). The most common is the small village, which usually consists of a collection of huts or houses covering a very small area and a trail running through the center. The other is settlement, or large village, generally consisting of several scattered groups of huts or crude houses. There is usually a main trail or "street" running through the area and a number of subsidiary trails linking up the groups of huts. The methods and procedures used to fight in these villages will generally follow the principles set forth in FM 31-50. However, jungle village fighting has its own peculiarities and demands some modification to the standard techniques of combat in built-up areas.

b. *Assignment and Organization.* A platoon frequently will be given the task of clearing a small village or a section of a large village.

- (1) *Organization.* A platoon or a unit may be organized as a combat patrol. Within this organization, provisions should be made for a headquarters or control element, a blocking element to seal off the village, an assault element and clearing parties.
- (a) *Control element.* The patrol leader should be located in the area of the assault element; he should position himself where he can observe the clearing action and not fix himself permanently with one element.
- (b) *The blocking or cutoff party.* This element should be under the leadership of the assistant patrol leader, whose task it should be to go well to the rear of the village and take up positions on the most likely escape route. This element must be in position before the remainder of the platoon starts to clear the village. This element must not be seen by the enemy and should remain well clear of

the village; if it is occupied the enemy will realize that they are trapped and will fight all the harder from the huts.

- (c) *Assaulting element.* The support part of the assaulting force covers the main village trails and huts with fire; clearing must not start until support is in position. If the village is occupied the platoon may have to fight to get this element into position. If necessary the assault element may have to advance by fire and movement to cover the clearing parties as they move through the village.
- (d) The clearing parties should be rifle squads.
- (2) *Hut clearing.* A suggested method:
- (a) Two riflemen covered by their squad enter the first hut from a side window, if this is not possible they should enter by the rear door observing closely for booby traps. They clear the first room and shout or signal "clear!"
- (b) On this signal, if necessary, the remainder of the squad enters the hut and clears all remaining rooms.
- (c) As each hut is cleared, the squad leader places cover on a second hut and repeats the procedure.
- (3) *Considerations.*
- (a) A clearing party must not move to next house until the first has been definitely cleared.
- (b) Each hut must be consolidated in turn.
- (c) Armed civilians should be treated as uniformed enemy.
- (d) Beware of women and children used as decoys.
- (e) Grenades can cause casualties among friendly troops when thrown into a hut constructed of bamboo, palm fronds or thatched grass.

85. Counterinsurgency and Counter guerrilla Operations

a. *Jungle Terrain and Preconditions for Successful Guerrilla Operations.* Guerrilla forces are most successful in areas where conventional forces are hampered in movement by the nature of the terrain and/or undeveloped communications systems. Terrain must allow guerrillas to move in secrecy and it must be so difficult to traverse that pursuit is pre-

vented or at least impeded. Guerrilla forces are forced to operate from bases which must be protected from aerial or ground observation. The political, economic and sociological conditions or attitudes of peoples of a given area must be of such a nature as to prompt civilian support of guerrilla forces, a factor which is absolutely essential to successful guerrilla operations. In light of description already presented, it can be seen that jungle terrain is ideally suited for guerrilla operations.

b. Counterinsurgency. Units operating in jungle to combat guerrillas must realize the importance of civic action in isolating the civilian populace from the guerrilla. A clear understanding of the psychological, ethnological, ideological and economic characteristics of peoples supporting resistance movements and constituting a potential guerrilla threat is important and must be used in planning and exe-

cuting civic action projects. The individual soldier must understand his role in all civic actions. Attitudes toward the civilian populace as well as occupation or administrative policies must be based on clear national policy and known to all before units enter an area to fight guerrillas.

c. Counter guerrilla Operations. When confronted with guerrilla forces, commanders should employ troops trained in jungle operations against them. Development of an absolute and complete intelligence system must guide all offensive actions. Units should strive to employ encirclement, ambush and raid tactics during the course of operations and commanders must insure that all areas are combed for guerrillas during each action. For detailed discussion of counterinsurgency and counter guerrilla operations see FM 21-50, FM 31-15, FM 31-16, FM 31-21, and FM 31-22.

CHAPTER 6

EMPLOYMENT OF COMBAT SUPPORT AND OTHER SUPPORTING SERVICES

Section I. INFANTRY

86. General

a. To obtain the full value of concentrated firepower from supporting weapons, commanders must determine how and to what extent they can overcome the limitations of the jungle on the mobility, visibility, and control of the infantry's organic supporting weapons. Good firing positions for direct fire and indirect fire weapons are comparatively hard to find in dense jungle terrain.

b. In jungle fighting, every sound or movement to the front is not made by the enemy. It could be a small friendly unit that has strayed from its assigned zone to the adjacent unit's line of fire. All units must include in their standing operating procedure the circumstances under which individual and crew-served weapons will fire on targets that are not definitely identified. The SOP should establish methods of maintaining lateral contact and must prescribe specific procedures for obtaining the current location of adjacent units.

c. The enemy will send out small probing units to invite fire, in an effort to locate weapon positions. Therefore, the commander must insure fire discipline at night, within the perimeter, and prescribe the conditions under which each type weapon will open fire. These conditions must be understood and adhered to by weapon crews and the leaders of supported units.

87. Mortars

a. *Independent Operations by Small Units.*

- (1) These weapons are impracticable for employment as organic to units of rifle company level and below in deep penetrations in jungle. The weight of the piece and ammunition place an extreme burden on assigned personnel, and the nature of am-

munition presents great danger of accidents due to premature explosion from rounds striking trunks, branches, or twigs of trees.

- (2) Mortars are effective if they are carried in vehicles as antimotor transport ambush weapons as they can be employed either in vehicles or from the ground after dismounting. Fire can be brought on ambush positions, then lifted on assault and shifted to block escape of ambush elements.

b. *Employment of Mortars at Battalion Level.*

- (1) Generally 81mm mortar elements from rifle companies should be placed under the control of the battalion commander.
- (2) Commanders must anticipate displacements well in advance and plan to prepare positions as far in advance as possible. The time factor for the preparation of emplacement, entry roads and mask clearance is greatly increased, sometimes requiring up to 24 hours.
- (3) The selection of good firing positions is difficult. Positions will be small because they must be cut out of the jungle. Advance parties must be increased in size and supplied with additional axes, machetes and engineer tools.
- (4) In preparing mortar emplacements as outlined in FM 23-92, the following modifications must be made.
 - (a) Dirt must be placed between the layers of logs to decrease bouncing.
 - (b) Base plates must be pegged at the rear to prevent sliding.
- (5) Cutting of mask clearance must be kept to a minimum. Small trees should be bent and anchored to preclude the permanent

loss of overhead canopy. Branches of fallen trees must be used as camouflage to replace the cut canopy, and fresh cut stumps must be blackened.

- (6) The thick undergrowth forces the survey team to tape short legs with resulting loss in accuracy.
- (7) 81mm mortar personnel must be physically conditioned to displace without vehicular transportation. Unit SOP's must charge subordinate elements with the responsibility of hand carrying ammunition for the mortars to predesignated points.
- (8) The limitation imposed on observation and visibility requires an increased number of observers and all leaders must have a working knowledge of observed fire procedures and means of communicating fire requests and adjustments.
- (9) Observers must receive extensive training in adjusting fire by using the creeping method of adjustment. Observed fire on the ground will be extremely difficult due to the vegetation which limits observation and visibility to short distances. The observers must operate well forward to be able to observe adequately.

88. 106mm Recoilless Rifle

Employment of the 106mm recoilless rifle will usually be restricted to roads and under battalion control. When employed, it is assigned its primary mission of antitank protection with a secondary mission of providing fire support.

89. 90mm Recoilless Rifle

The accuracy, mobility, and striking power of the 90mm recoilless rifle organic to infantry units makes them invaluable as supporting weapons in jungle operation. They are especially useful in reducing pillboxes and bunkers frequently encountered in jungle operations. Care must be taken to select positions that afford safety from, and prevent disclosure by the backblast.

90. Mines and Booby Traps

The jungle lends itself to the use of mines and booby traps. The characteristics of the jungle cause their emplacement to be comparatively easy and detection extremely difficult. Mines and booby traps

can be used to advantage along trails, roads, ridge lines, streams, and in conjunction with other defensive measures. Recording and reporting is extremely important and is accomplished as outlined in appropriate publications (FM 5-31).

91. Small Arms

a. U.S. Rifle, 7.62mm. This is a precision weapon which should be fired from the shoulder to deliver steady, well aimed shots to realize its maximum efficiency in jungle fighting. The 7.62mm cartridge gives excellent penetration and accuracy; the bullet sometimes sheds its jacket when passing through thick trees or large roots and the lead core continues on to deliver good destructive effect. This characteristic lessens the effectiveness of cover made available to the enemy by the vegetation. Care must be exercised to prevent dropping magazines on the jungle floor where they may be easily lost.

b. U.S. Rifle, 5.56mm. This extremely light and compact weapon is ideally suited to jungle combat. Its short length and the light weight of the ammunition it fires makes the weapon easy to employ rapidly. The cartridge is a high intensity, high velocity round with good ballistic characteristics; penetration is outstanding and the bullet tends to tumble when deflected giving good wound effect. The short length makes it easy to use by men of small stature. Precautions with magazines apply as with the 7.62mm rifle.

c. Machinegun, 7.62mm. This weapon is an ideal automatic arm for jungle combat. Its compact design, light weight and excellent sights enable it to be fired from the standing, sitting or squatting position. Effective hip fire can be delivered if a sling support is used. A high proportion of tracer ammunition (1 tracer to three ball) should be used and the gun fired in bursts of 5 to 6 rounds; fire can then be observed in subdued light along the line of tracer fire. The bipod should be folded except when the opportunity to fire from the prone position exists.

d. 40mm Grenade Launcher. This weapon, although shoulder fired, is a large bore weapon and is extremely effective for jungle fighting. It is compact, light and can be fired using the same positions as the service rifle. It can be used for reduction of point targets, against groups of enemy soldiers and for fire into the killing zones of ambushes. Great

care must be taken to prevent its fires from being masked by tree limbs. Although the individual round is light, careful selection of targets is necessary, to reduce resupply problems. Dense vegetation will reduce its normal effective bursting radius.

e. Grenades. Grenades must be used carefully in jungle. The limitation on the distance they can be thrown and the difficulty of observation may result in casualties to using troops. They are most effective when used against hastily prepared positions and groups of enemy personnel. They are also useful in prepared defensive positions and against dug-in positions in the offense.

f. Bayonet. This weapon is often cumbersome for use in jungle. It is effective in open areas and is ideal for hand to hand fighting during counterattacks from a defensive position in which the vegetation has been shot or burned away. It should be

affixed to the rifle only on order of the squad or platoon leader.

g. Shotgun. The desirable characteristics of this weapon for jungle fighting have already been mentioned. It is effective for use in ambushes and by forward elements of a patrol.

h. Obsolete Military Arms. Due to the availability of military arms on the open markets, especially of bolt action rifles, it will be found that guerrilla forces will be armed largely with these weapons. Every jungle soldier should be prepared to use these weapons if they are captured from the enemy. Knowledge of all types of enemy weapons is important. Friendly troops should use enemy weapons only in emergencies, the characteristic sounds of both friendly and enemy weapons are often a valuable intelligence source used to identify the firing units.

Section II. ARTILLERY

92. General

a. Artillery Principles. The principles of artillery employment in jungle operations conform to the tactical and technical principles set forth by FM 6-20-1 and FM 6-20-2.

b. Flexibility of Artillery Favoring Employment in Jungle.

- (1) Use of artillery fire is not restricted by bad weather.
- (2) Artillery can fire effectively day or night.
- (3) Artillery can achieve surprise as fire can be brought down upon a target without warning.
- (4) Artillery is capable of sustained effort.
- (5) Helicopters greatly increase artillery mobility and ammunition resupply.

c. Limitations Imposed by Jungle on Employment of Artillery.

- (1) Observation from the ground is very restricted, and augmentation by air observation is necessary. Both methods will be severely hampered by dense vegetation and tree canopy.
- (2) Due to the problems of observation, it is difficult to compare results of predicted fire with observed fire. Even predicted fire may be less accurate than normal because

of inaccurate maps and scarcity of current meteorological data.

- (3) Limitations on observation necessitate increased safety factors and distances when delivering fire close to friendly troops.

93. Types of Artillery Support Available in Jungle Operations

a. General. Enemy troops in thick jungle can be driven out of their areas by artillery fire and forced into friendly ambush and blocking positions.

b. Harassing Fire. Artillery can be used to keep guerrillas on the move if their general location is known or to harass them by methodically searching an area. This fire must be carefully planned and controlled to avoid waste and excessive expenditure of ammunition.

c. Destruction Fire. This is especially useful in attacking known enemy strongpoints. However, use of this type fire against guerrillas is limited by the requirement for registration and the resultant probability of loss of surprise, as well as normal lack of information on exact locations.

d. Interdiction of Escape Routes. Canalization of escaping enemy forces into ground of the attackers' choosing is possible with artillery fire.

e. Deception. Artillery fire in an area away from that in which friendly troops are operating may deceive the enemy; certainly, if such fire can cover noise of movement of friendly forces they may be able to approach within assaulting position of the enemy without being detected.

f. Searchlights. Searchlights can be used to provide datum points for aircraft and as rallying points for assembly of personnel.

94. Coordination With the Infantry

See FM 6-20-1 and FM 6-20-2.

95. Positions

a. Battery positions and clearings usually have to be cut out of the jungle and are therefore small and compact. Logs from clearing should be saved to construct gun emplacements and personnel shelters. The swampy condition of the terrain may often make it impossible to dig adequate gun emplacements.

b. Since the jungle affords excellent concealment for enemy offensive operations, all artillery positions must provide ample security against enemy infiltration. To insure protection for the positions, security measures include warning devices, all around security, and patrols to maintain liaison with other installations. To facilitate security, fire support and logistical installations may be grouped in general proximity to each other. Because of their size artillery positions should always take adequate air defense measures.

c. In coastal areas, suitable positions may often be found on the beaches, around plantations, or on nearby islands.

96. Observation

a. Forward observer teams are handicapped by restricted visibility and the unavailability of suitable observation posts.

- (1) Forward observers must constantly remain with the supported unit.
- (2) Forward observers should, where the jungle terrain permits, coordinate with the aerial observer to verify the location of friendly troops, and to obtain positive sensing of rounds.

- (3) In making adjustments, forward observers should be proficient in adjusting by sound since observation and visibility may be limited to a few yards.

b. Air observation is restricted over jungle terrain, but may be used to good advantage to—

- (1) Observe for enemy activities such as movement over water or cleared areas on land.
- (2) Give the general location of enemy installations. Smoke from fires may be seen.
- (3) Locate enemy artillery positions.
- (4) Observe and adjust artillery fires.

97. Offense and Defense

See FM 6-20-1 for the principles of the employment of artillery in the offense and defense. (Displacement may be very difficult, due to lack of roads and suitable position areas.)

98. Targets

Targets are hard to locate. After locating suspected targets, it may be necessary to blast away jungle undergrowth by means of air bursts and tree bursts before maximum effect on the target can be obtained. This will often require expenditure of large quantities of ammunition.

99. Ammunition

a. Special care must be taken to protect ammunition from dampness and deterioration in tropical jungle climate.

b. The selection of types of ammunition and fuzes for jungle targets is the same as for similar targets in normal locations except that:

- (1) Time fuze adjustment is difficult, even in open areas, because of the high vegetation.
- (2) The burst from a proximity (VT) fuze is difficult to sense when the trees form an overhead canopy. The performance of this fuze is apt to be erratic, due to the excessive moisture in the air and on the ground.
- (3) The delay fuze is valuable for obtaining bursts near ground level when foliage is high and thick.
- (4) Smoke or WP is valuable for use in adjustment, especially for aerial observation.
- (5) Base ejection smoke may be used for close air support marking.

100. Communications

a. Wire is the most mechanically reliable means of communications for controlling artillery in jungle operations. However, it is difficult to install and maintain. Light wire can be laid on top of foliage by army aircraft. Security of an extensive wire net is difficult and may preclude its use for other than very routine communications.

b. The range of radios is shortened by jungle growth, but this problem may be partly solved by using radio relay stations, both air and ground.

101. Fire Control

Fire control is centralized whenever possible; however, decentralization of control will be necessary as the density of the jungle increases.

Section III. INFANTRY TANK COOPERATION

102. General

The value of tank support in jungle warfare lies in the accuracy and weight of firepower that can be produced even at single tank level. Lack of roads and the general nature of the terrain in jungle does not favor tank employment on a large scale. However, in amphibious operations against the coastlines of jungle areas tanks may play an important role. Precision shooting by tanks at pin point targets such as bunkers or buildings is frequently the most valuable fire support available to infantry in this type of fighting. Tanks may be used to control limited road networks in jungle areas and their value in such a situation would be limited only by existing bridges and available bridging equipment.

103. Tasks of Tanks

Tanks provide not only material but moral support. When operating with infantry their tasks are:

a. Immediate destruction of weapons, troops or positions which would impede the advance or hold up the assault of infantry.

b. Accompany infantry to the objective. If this is not allowed by the ground, tanks must support infantry by fire if possible.

c. Dominate the objective and destroy enemy armor, when applicable.

d. In defense, destroy enemy forces penetrating the defensive position.

104. Tasks of Infantry

a. Seize and hold the objective.

b. Destroy enemy short range antitank weapons.

c. Destroy enemy automatic weapons which the assaulting tanks may have only temporarily silenced.

d. Protect tanks from attacks by enemy infantry.

105. Combined Arms Training for Jungle Operations

a. In tropical countries the large areas of primary jungle and secondary growth with resulting poor visibility, poor communications and difficult going require a high standard of joint training if operations by infantry and tanks are to be effective.

b. Actions will be fought at close range. Speed, is therefore essential. Tanks and infantry will suffer needless casualties without precision in teamwork. Infantry must appreciate the accuracy of the tank gun in order to work close to the tank gun fire on the target. This requires practice and rehearsals with tanks that will support a particular attack.

106. Close Escort for Tanks in Jungle

a. Due to extremely poor observation of the crew when operating in jungle country, the unprotected tank is extremely vulnerable to close range anti-tank weapons. The front of the tank is least vulnerable in this respect, having better armored protection and visibility in that direction. The infantry must insure that close range tank killer teams do not engage the tanks. This applies in particular to the sides and rear of the tank.

b. The provision of tank escorts is the responsibility of the commander of the infantry/tank group. The degree and nature of protection necessary for tanks must be separately determined for each changing situation. Often the protection for tanks will be afforded by the proximity of the infantry within whose formations or dispositions the tanks will be moving or operating. The size of the escort and the tactics adopted are decided between the infantry and armor commanders.

107. Formation of Infantry Tank Team in Movement Along Road or Trail

a. Formations will vary with terrain and the tactical situation. A suggested formation for an infantry/tank team when moving along jungle trails or roads is to position infantry squads in front flanks and rear of tanks. The lead (or front) squad should have a small mine detection group, if available. If the sides of the road are fairly open the close tank escort need not move with each tank, but as a squad covering the last tank. Tanks must cover each other and visual contact must be maintained throughout the tank element.

b. The infantry must not spread out in a manner that would restrict the fires of the tanks, rather they should take up formations that will enable them to protect the tanks, fight as a unit, and still allow the tanks freedom to fire. In sparse undergrowth or plantations, it may be necessary to use two squads forward to insure that there are no enemy positions near the road.

c. For a detailed discussion of infantry/tank tactics, techniques and formations, see FM 7-15 and FM 17-33.

Section IV. AIR DEFENSE ARTILLERY AND NAVAL GUNFIRE

108. Employment of ADA

a. *General.* The basic tactics and techniques involved in the employment of Air Defense Artillery (ADA) will not change greatly in jungle operations (FM 44-1 and FM 100-5). Extensive detailed planning is required in advance of an operation to determine the amount, type, and most effective employment of ADA. Air defense must be provided for ports, beachheads, and advanced bases which are the starting points for offensive jungle operations. As the operation progresses, air defense must be planned and provided according to priority, for installations, troop concentrations, airfields, and other activities in open areas subject to aerial observation and attack. ADA defenses fall into two general categories:

- (1) *Installations subject to ground attack.* In the early phases of an operation, ADA deployment is limited by a defendable perimeter. ADA must remain within the main perimeter or be provided with a strong local defense. ADA should be employed to fire on surface targets as well as aerial targets.
- (2) *Installations relatively secure from ground attack.* These conditions are encountered in defending existing installations in friendly territory or the expansion of defenses in captured territory well behind the combat zone. The preparation and occupation of such defensive positions is relatively deliberate. Position areas should be selected to maximize the capabilities and minimize the limitations of equipment

employed. Roads may not be present and sites may require extensive preparation at the time positive areas are selected. Local security must be provided but is not a primary factor in this type of defense.

b. *Low, Medium and High Altitude ADA.* Normally there will be a requirement for low, medium and high altitude ADA at ports, beachheads, and other areas used as the forward base for jungle operations. Since these ADA systems are dependent on radar for fire control, their siting is much more critical than Forward Area Weapons (FAW). The size and weight of equipment present serious problems in movement through jungle. Until such time as low, medium and high altitude ADA defenses can be installed, tactical aircraft must be depended on to defend forward installations from high level aerial attack. Sites should be selected to facilitate fire control system coverages for air defense. In the defense of shore installations, FAW can frequently be sited to fire on waterborne targets in addition to their air defense role. Construction equipment must be available, not only to prepare roads and sites prior to occupation, but to maintain, improve, and expand the defense. Requirements for construction equipment and personnel are much greater in jungle than other type operations.

c. *Forward Area Weapons.* FAW are more mobile and have fewer technical limitations than low, medium and high altitude ADA. There will be fewer areas requiring FAW protection. Concentrations of material and personnel are greatly restricted in jungle areas. Jungle areas provide better

means of passive defense. The overall requirement for FAW will depend on the individual operation. Although the number of defended areas will normally decrease in jungle operations, those subject to attack will become increasingly vital and may justify a higher level of defense than similar installations in another type operation.

d. Critical Aspects. The most critical aspects of employment of ADA are the need for reconnaissance in considerable detail, the requirements for extensive clearing of fields of fire, and the inaccessibility

of good positions. This may prevent the attainment of the optimum level of defense desired, by limiting the number of weapons that may be employed in a defense area. Further, terrain considerations may require decentralization of control.

109. Employment of Naval Gunfire

The principles of employment of naval gunfire are the same as for normal operations, with the exception that observation will be limited. At times, observation may be possible only from the air.

Section V. ENGINEERS

110. Road Construction

a. The speed with which jungle operations are conducted is affected more by engineer effort than in normal operations. In temperate zones, the progress of the infantry usually depends upon how fast their units can overcome enemy resistance, and the ability of the engineers to keep up with the most rapid advance. In nearly all jungle areas, roads are relatively undeveloped or nonexistent. They are usually narrow and winding, incapable of supporting sustained military traffic. Air support becomes more important. Therefore, the bulk of engineer effort centers around the construction and maintenance of roads and trails and construction of air fields and supporting facilities.

b. There are numerous factors that complicate road construction in the jungle. The heavy rainfall in these areas imposes a drainage problem of major concern. Whenever possible, low ground should be avoided in laying out a road. When it is impossible to bypass low, swampy ground, it will be necessary to construct long sections of corduroy road. It is advisable to cut the right of way much wider than normal so the sun can dry out the road bed. The enlarged right of way also provides room for the construction of ditches necessary to keep the subgrade drained.

c. The engineers need heavy construction equipment, and additional bulldozers and other construction equipment must be procured for supporting engineer units or installations. If the road net will permit, an alternate route plan is set up so the main roads or sections of them may be closed when they need major repairs.

111. River Crossing

a. In large scale jungle operations, when time and equipment are available, the standard river crossing procedures, bridging, and stream crossing expedients described in FM 31-60 are applicable. In small scale operations, or as field expedients, the rope suspension bridges and the suspension cable methods, as described in FM 31-72 and TM 5-279, may be useful.

b. The jungle provides excellent concealment for river crossing operations in most instances. Troops and hand-carried material can be brought up to almost any desired site without additional road construction. However, when selecting the site, the climatic conditions of the area pertaining to the annual rainfall and flooding conditions must be carefully analyzed. Flash floods are characteristic of most jungle areas, even in the dry season. If heavy equipment is to be used, the road construction required and soil trafficability must be considered.

112. Water Supply

Water sources are usually abundant, but special treatment is required for purification. See paragraph 144 for health hazards and methods of engineer and individual water treatment.

113. Mine Warfare

Since the jungle itself is an effective obstacle against vehicles, antitank mines and other anti-vehicle obstacles are normally confined to roads, trails, and occasional patches of cleared ground. Antipersonnel mines may be incorporated into defensive plans to delay and divert the enemy and to serve as warning devices, however, the logistical support, in any quantity, is very difficult.

114. Mapping

Because of the inaccessibility of jungle areas, adequate maps are scarce and those that are available are frequently inaccurate except for the location of coastlines and principal rivers. The numerous minor swamps, streams, inlets and lagoons are seldom indicated and contours, if shown, are seldom accurate. The trail nets shown can seldom be depended on, because trails change rapidly in the jungle. Native towns and villages frequently bear native names entirely different from those on the maps and locations change often. Any information that can be used to correct existing maps should be forwarded to the appropriate headquarters for prompt dissemination. Engineer reconnaissance to supplement the data is of prime importance. The engineers should obtain information on the following topics:

- a. Location and condition of roads and trails.
- b. Locations for possible road construction and building materials.
- c. High water level of streams.
- d. Condition of banks at river crossing sites.

e. Location of water sources for drinking, laundering, and bathing.

115. Planning

In planning for a jungle operation, the usual demand for heavy construction equipment must be considered. The engineers determine what equipment is available and how it may be procured. The jungle provides an abundant supply of timber and it is often desirable to establish a sawmill to provide lumber. Provisions should also be made for treatment of piling and other bridge material to retard decay and withstand the ravages of termites. Sand bags disintegrate rapidly in the jungle and resupply must be available.

116. Nuclear Weapons

The obstacles resulting from effects of nuclear weapons in jungle terrain may be easier to bypass than to overcome. In a tactical situation, the time and engineer effort required to cross nuclear blow-down areas may be excessive. Alternate route of movement must be planned for and prepared as soon as possible to provide means for continuing movement despite nuclear attack.

Section VI. CHEMICAL, BIOLOGICAL AND RADIOLOGICAL (CBR) OPERATIONS

117. General

The doctrine for the employment of chemical and biological weapons in jungle terrain is generally the same as in other terrain (FM 3-10). However, the techniques for the employment of CB weapons in jungle terrain differ from those in other types of terrain because of the peculiarities of weather, heavy foliage, and the difficulties of observation and supporting fires. The doctrine for defense against enemy use of chemical and biological weapons and against radiological contamination is contained in FM 21-40; however, climatic conditions have a profound influence in jungle operations. Special guidance for the employment of chemical weapons in jungle operations will be found in chapter 5, FM 3-5.

118. Toxic Chemical Agents

a. Chemical agents HD and VX are used to contaminate troops, terrain, and materiel and are extremely effective in jungle when used against troops

who are not wearing complete protective clothing and equipment. High temperature and low winds help to maintain high vapor concentrations of agent HD. Droplets of HD on foliage and on the ground present a relatively persistent hazard to troops in the area. Refer to the classified supplement of FM 3-10 for information on agent VX.

b. Chemical agent GB is effective against troops in jungle when used in a surprise dosage attack. GB aerosol can penetrate jungle foliage and field fortifications peculiar to jungle, such as bunkers, caves, and strong points.

c. XV-filled and HD-filled land mines can be used effectively to mine and boobytrap trails used by the enemy or leading into friendly defensive positions. The mines need to be protected from rust and fuzes and detonators must be protected from moisture and mildew. Care must be taken that trip wires are not fouled by rapid growth of jungle foliage.

d. Artillery projectiles and aerial bombs with delay fuzes are the most effective means of delivering toxic chemical agents in the jungle. Artillery projectiles bursting more than 40 feet in the air result in loss of the agent; the average loss of chemical agent when delay fuzes are not used is about 25 percent. Aerial spray of chemical agents XV and HD is not very effective due to the jungle canopy.

e. When toxic chemical agents are employed in jungle, friendly troop safety is an important consideration not only against contaminated terrain but against downwind vapor hazards. (Chemical munition requirements will be found in FM 3-10.)

f. Doctrinal guidance for the employment of incapacitating agents and riot control agents will be found in FM 3-10.

- (1) Incapacitating agent BZ can be employed against enemy troops when it is militarily or politically imprudent to employ toxic chemical agents.
- (2) Riot control agents may be used in anti-guerrilla operations, in controlling rebellious prisoners of war, and in subduing rioting civilians.

119. Smoke and Flame Weapons (FM 3-50 and FM 20-33)

a. Smoke may be used for signaling, for marking targets and for providing smokescreens, curtains, and obscuring smoke on enemy installations. Colored smoke grenades, shells and smoke streamer rifle grenades are useful for signaling or marking purposes. Limitations on visibility in the jungle will govern their use. For example, smoke streamer rifle grenades projected above the jungle canopy may not be visible to ground troops, but they can be useful signals to air observers and to specially located ground observers.

b. Smokescreens and curtains produced by mechanical generators, smoke pots, shells, rockets, or aerial bombs may be used to limit air and ground observation when the vegetation and tree top canopy are not dense enough to give concealment. Smoke sprayed from airplane smoke tanks will generally be ineffective in jungle operations because of turbulent air currents above the jungle canopy which rapidly disperse the smoke. Smoke curtains produced by artillery and mortar shells can be employed effectively by ground troops in the attack.

Enemy individual bunkers and isolated strong points can have their vision obscured by the use of HC and White Phosphorous (WP) grenades prior to assault. HC and WP may have an incendiary effect plus a casualty and demoralizing effect which may be desirable.

c. Flame weapons are used effectively in the jungle to cause casualties and to destroy the natural concealment and camouflage afforded by the vegetation. Flame throwers, artillery, mortars, rockets, and fire bombs delivered by tactical air are all effective methods of employing flame weapons, including incendiaries, in this type of terrain. Flame landmines, prepared locally from empty fuel drums or other containers filled with thickened fuel, can be used defensively against infiltrating or attacking enemy forces for warning effects, casualty effect, and for battlefield illumination.

120. Biological Agents

General. Biological agents are living organisms that are effective against men, animals and plants; certain chemical agents are also effective against plants. Biological agents can be used effectively in the jungle against troops to produce casualties and against crops to destroy them, without the massive destructive effects of nuclear or high explosive weapons. Refer to FM 3-10 for doctrinal guidance on the employment of antipersonnel biological agents. Refer to TM 3-216 for technical data of biological agents.

a. *Antipersonnel agents.* Natural jungle conditions such as high humidity and the protection from the sunlight afforded by the jungle are conducive to the effective employment of biological agents. Biological agents disseminated by aerial spray cover large areas. Area coverage of biological agents disseminated by bomblets is reduced because of low wind speeds below the jungle canopy. Biological agents produce delayed casualties and detailed planning is required to employ them so that their effects are coordinated with tactical operations.

b. *Antiplant Agents.* There are a number of biological agents which may be effective in the jungle against plants, shrubs, and trees and against the food and industrial crops produced by them. Biological operation for destroying food supplies in an area may require concurrent planning for subsistence aid for the protection of friendly troop supplies.

121. Chemical Antiplant Agents

Certain chemicals possess an offensive potential for destroying or seriously limiting the production of crops and for defoliating vegetation. The chemical compounds used are plant growth regulators that modify the normal growth pattern of plants or defoliant agents that kill or damage the plants. Defoliant agents can be used to expose ground operations, installations, materiel, and personnel to observation; to mark targets, positions, and guidelines; and to clear and keep open fields of fire around defensive positions. Destruction of natural vegetation may also be of assistance in revealing camouflaged activities. Present defoliant agents disseminated by aircraft spray require 3 to 4 weeks or even longer to be effective against tropical vegetation. Tactical operational planning must allow for this delay factor. Refer to TM 3-215 for technical data on chemical agents.

122. Nuclear Weapons Effects

The effects of nuclear explosions will not be significantly affected by the dense vegetation of jungles. The blast effect may be distorted by the dense vegetation, but will create considerable missiles and obstacles. Trees blown down may reduce fields of fire. During the dry season, fires may be started in

dry brush and flammable supplies by the thermal effects. Jungle terrain will not significantly alter the initial nuclear effects. The intensity of radiation from radiological agents and radioactive fallout may be reduced by extremely heavy vegetation as some of the particles will be retained by the jungle canopy. Subsequent rains may wash these particles to the ground, and concentrate them in water collection areas. Actions required of individuals and units in radiologically contaminated areas are contained in FM 3-12, FM 21-40 and FM 21-41.

123. Defense Against CBR Attack

Refer to FM 21-40 for guidance in small unit procedures to be used against CBR attack and to FM 21-41 for individual actions against CBR hazards. It should be noted that the protective mask and permeable protective clothing are barely tolerable in jungle terrain and climate. Limitations on vision imposed by the mask combined with personal discomfort as a result of wearing the protective equipment may decrease individual efficiency and even present a morale problem. Proper training is necessary in order to overcome or allow for these problems. In addition, special precautions must be taken to maintain unit defensive equipment in usable condition because of mildew, rot and rust threats existing in jungle areas.

Section VII. CLOSE AIR SUPPORT

124. Doctrine

Doctrine for employment of air support in open areas is equally applicable in jungle.

125. Types of Air Support

The following types of air support are effective in support of ground forces in jungle combat:

- a. Offensive air support.
- b. Transport support.
- c. Photographic and visual reconnaissance.

126. Offensive Air Support

Following are types of offensive air support:

- a. Air strikes. These consist of bombing, rocket and/or gun strafing attacks against known enemy positions or locations.
- b. Harassing attacks. These are bombing, rocket and/or gun strafing attacks against areas of enemy activity.

c. Close support. This consists of offensive air action in direct support of ground troops.

d. Crop destruction.

127. Missions of Offensive Air Support

- a. Kill the enemy.
- b. Disrupt enemy communications and organization.
- c. Lower enemy morale by inducing sense of insecurity and to induce surrender.
- d. In case of operations against guerrillas, to induce the enemy to keep on the move thus increasing chance of contact and kills by ground forces and isolating them from their bases.
- e. In counter guerrilla operations assist in food denial attempts by crop destruction.

128. Air Strikes

- a. In open country air strikes are attacks against pin-pointed targets. However, in jungle, targets are

rarely visible and the lack of positive aiming points favors the type of attack in which bombers drop a pattern of bombs designed to envelop the target area.

b. Requirements for air strikes include positive information regarding presence of enemy forces in target areas. Accurate definition of the target is essential. Immediate followup by ground forces should be made to exploit the destructive effect of the air strikes.

129. Harassing Attacks

These attacks maintain pressure on enemy by interdicting certain areas to prevent or discourage use by the enemy and to deny or limit the enemy's freedom of movement. In operations against guerrillas this type of air action keeps them moving and thus increases chance of engagement with ground forces.

130. Selection of Targets

The following factors should be weighed prior to requesting air action in jungle:

- a. The desired effect on the target to be produced by air action.
- b. Type and size of target.
- c. Accuracy with which the target can be fixed.
- d. Timing and duration of the attack.
- e. Position of our troops in relation to target.

131. Air Transport Support

a. *Forms of Support.* This support primarily consists of air delivery of personnel and equipment by air-dropped and air-transported methods. It includes paratroop operations, air transported movement of operational units and equipment and casualty evacuation. It also includes communication

flights for establishing relay stations and for psychological warfare broadcasts.

b. *Preparation of Drop Zones.* Because of the nature of jungle terrain certain considerations are important for constructing drop zones. To insure an accurate drop, the pilot of an aircraft should be able to concentrate solely on adjusting height, speed and alignment before dropping. Any hills near the approach to the DZ or obstructing the route after dropping will adversely affect his concentration on the DZ and the drop will be consequently less accurate. A second factor affecting accuracy is identification of the DZ location. The further away the pilot can recognize the DZ the more time he will have to make the adjustments necessary to insure an accurate drop. To insure this accuracy the pilot should be able to sight the DZ position at least 400 yards from the release point. This means that an observer on the ground should be able to see the aircraft at least one quarter of a mile away on its run. To give a reasonable guarantee that all packs will fall into the DZ it should be cleared to a minimum of 40 yards in diameter. All drop zones must be marked with panels, smoke or balloons, if available.

132. Photographic and Visual Reconnaissance

Benefits to be derived from this support are minimized in primary jungle due to cover of the canopy. However, in secondary jungles, swamp areas, cultivated areas, villages and other well defined locations, visual reconnaissance may help the commander. In most instances photographic coverage of an objective area and march routes should be requested. Detailed study of film may reveal pertinent information of the enemy, his activities, and outstanding characteristics of the ground.

Section VIII. EMPLOYMENT OF ARMY AVIATION

133. Roles and Priorities

The types of tasks performed by Army aviation in support of jungle operations are not unlike those performed elsewhere (FM 1-100).

134. Special Considerations in Employment of Helicopters

a. Tasks.

- (1) *Troop lifting.* Swift transportation of infantry by helicopters gives great flexibility to ground forces. The hovering characteristic of the helicopter enables units to move into areas with no prepared landing areas; this is done, first by rappelling clearing parties and then by dropping clearing tools and explosives for landing area construction.
- (2) *Casualty evacuation.* The helicopter constitutes a swift, flexible means for casualty evacuation. The knowledge that such means exist helps the morale of the troops operating in otherwise inaccessible areas. Where landing areas exist the journey from forward to rear areas can be achieved in one move; where landing facilities do not exist a radio request for casualty evacuation can bring a fixed wing aircraft to locate landing areas and guide parties to them prior to the arrival of the helicopter. This method will economize helicopter flying time.
- (3) *Resupply.* Use of the helicopter for resupply in jungle operations has many advantages. Helicopters can land and dis-

charge stores in a comparatively small area and they can hover and free-drop from low levels where landing is not possible. The one big disadvantage of using the helicopter in this role is the payload limitations and its limited range.

- (4) *Reconnaissance.* An advantage of the helicopter is that it can fly close to the ground at low speeds. A disadvantage is that it is extremely vulnerable to ground fire which cannot easily be detected. Helicopters should be equipped with machine guns and rockets to suppress ground fire.

b. Minimum Characteristics of Helicopter Landing Areas.

- (1) Clearing 50 yards in diameter cut down to 2 feet in height.
- (2) Central area of firm soil 30 yards in diameter cleared down to ground level and swept of all loose sticks, stones, etc.
- (3) Fly-in 30 yards long the width of the landing zone, the slope not more than 30° up to 3000 feet elevation, 20° up to 4000 feet elevation and 10° up to 5000 feet elevation. If the landing area is above 5000 feet elevation the approach to it must be completely flat.

c. *Platforms.* Landing platforms should be constructed when the nature of the ground does not present a flat central area for landing. The platform must be a minimum of 25 feet square and must be able to support 4 tons. The maximum permissible slope is 7°.

CHAPTER 7

LOGISTICS

Section I. GENERAL

135. Special Considerations

a. The availability of trails, roads, and waterways; the density of natural growth; the season; and general terrain conditions will have a direct influence on logistical operations. Supply requirements must be anticipated well in advance of actual needs. Careful planning is necessary to conserve transportation facilities, and the control of all classes of supply must be closely supervised in order to exclude surplus and nonessential items.

b. Logistical personnel must be proficient in advance planning and in forecasting needs. Replenishments must be requisitioned well in advance; reconnaissance of supply routes and water points must be continuous; and alternate routes and distributing points must be located and developed.

c. The jungle affords concealment from air observation and, since it is easier to protect convoys from ambush in the daytime, commanders should move supplies during daylight hours.

136. Transportation

a. Because of the lack of routes of communications and the difficulties involved in constructing roads and trails, transportation presents a series of problems in jungle operations. Utilization of all modes of transportation should be considered for maximum efficiency.

b. The basic means of jungle transport is hand-carry by indigenous help or troops, though pack animals are frequently employed. Jungle vegetation is not satisfactory forage for domesticated animals unless supplemented, so a large part of their load must necessarily include feed for them. Native pack animals and handlers may be used to furnish transportation and to preserve the combat efficiency of troops, but food, pay, and the dependability of the natives must be carefully considered.

c. Air transportation is an important factor in supply for jungle operations. Supplies can be airlifted to units when all other transportation fails. Army aircraft can be employed with success in supplying isolated patrols and small units. When the aircraft cannot land, supplies may be delivered by parachute or free drop. Float aircraft may be used when suitable water areas are available. When aerial resupply is being employed, the following factors should be considered:

- (1) Communication with delivery aircraft.
- (2) Clearing and marking of drop or landing zones.
- (3) Times of delivery.
- (4) Organization of recovery crews.
- (5) Preparation of type loads.

d. Waterborne transportation is the most economical and often the surest means of supply. Streams, lagoons, and other waterways should be used to the maximum extent possible. Supplies transported over waterways are less susceptible to loss or damage, fragile containers are safer, and the destruction caused by insects is largely avoided. Boats, canoes, and rafts are the most practicable types of water craft to use. Distribution points should be established along waterways to save transportation by men, animals, and vehicles.

e. Tropical rivers are subject to rapid changes in depth and speed of flow due to rainfall variations. Flooding conditions are often an aid to river transport, because the possibility of using motors is greatly increased. If water transport is a principal means of resupply and evacuation, the wet season will prove to be operationally advantageous. A river may be less than ankle deep in dry season, yet flow at a depth of several feet during wetter periods.

Also, sudden flood crests are a danger to cargo-laden craft. These are particularly dangerous during loading and unloading.

f. Wheeled vehicle transportation is generally impracticable except on roads (and in the dry seasons on wide trails) and in areas where the jungle growth is light. Engineer and pioneer troops can improve trails to permit movement of 1/4-ton trucks and trailers in areas close to the combat echelon. Track laying vehicles are generally reliable in jungle operations and furnish a means of logistic support; however, their use increases maintenance problems. To achieve maximum efficiency in the use of vehicles it may be necessary to establish transfer points for loads; that is, larger vehicles transport supplies as far forward as they can be moved and supplies transloaded to smaller, lighter vehicles which, in turn, will be used to move supplies as far forward as practicable. Pack animals or carrying parties then move the supplies to their destination as required.

137. Classes of Supply

a. The Standard B Ration is the field ration primarily used during jungle operations under conditions where kitchen facilities, with the exception of refrigeration, are normally available. The ration consists of nonperishable items, mainly canned and dehydrated. The Meal, Combat, Individual (replaces the C ration) or Ration, Small Detachment, 5 persons, will normally be issued to units actively engaged in combat. Road and trail limitation will require that the unit trains be located back in the rear and carrying parties be used to distribute the rations. The number of rations carried by the individual soldier should be determined by such factors as how and in what quantities food can be brought forward, when resupply will be effected, and the estimated duration of the operation. Hot meals should always be served whenever possible. Feeding is usually done during daylight because of the

danger and difficulty of movement at night and the possibility of enemy ambush or night attacks.

b. In a tropical environment rapid deterioration is a primary consideration in class II supply; issue clothing, particularly combat boots and socks, last a very short time. For items of this nature, requirements should be estimated well in advance and special provisions should be made for adequate resupply. At small unit and battalion levels, limited emergency supplies of assorted combat boots, socks, and similar items of short wear periods should be stocked.

c. The supply of class III items does not initially present a great problem, as relatively few vehicles will be in operation. However, the battalion will establish a class III distributing point for vehicles that are operating. Resupply of gasoline to vehicles will be made directly from gasoline tank trucks. In addition, empty 5-gallon cans will be exchanged for full cans to augment the gasoline resupply system as required.

d. The supply of class IV items will, for the most part, concern special items of individual and unit equipment. In many cases, the equipment normally authorized a unit will be augmented by additional allowance, and special items of clothing and equipment that are needed but not authorized may be obtained. The use of large amounts of special equipment for defensive positions is the exception rather than the rule due to difficulties in bringing up such materials.

e. Because of the weight and bulk involved, the supply of ammunition and explosives often presents the most difficult resupply problem. The best solution is close control exercised by all leaders over ammunition expenditures within their units and the employment of the appropriate weapon for the fire mission. Careful consideration should always be given the criticality of transport for movement of resupply tonnages, particularly where class V supplies are concerned.

Section II. MEDICAL SERVICE

138. Employment

a. The manner in which medical units support their tactical organization depends on the employment of the supported unit. Wide variations may be expected at division level and below, but above division medical support is normal. The greatest variances will be found in the support of the infantry battalion by the medical platoon, and with the support of the infantry division by its medical battalion.

b. The medical platoon requires considerable augmentation when undertaking jungle operations. This is due to the disease-causing humidity and heat, location of tactical units supported, difficulty of crossing terrain with casualty loads, and a requirement to increase medical personnel attached to the tactical companies being supported and operating relatively independently. This augmentation may best be accomplished by the command requesting additional medical personnel, through channels, from field army unit designed for this purpose. Plans to use native litter bearers, when available, should also be established prior to entry into combat. Equipment may require modification to permit maximum efficiency in combat. This may include establishment of pack equipment for all medical installations, and the replacement of wheeled ambulances with other evacuation means appropriate for use in jungle terrain.

139. Battalion Medical Platoon

a. *Evacuation Section.* Vehicles used as front line ambulances may not prove practical on jungle trails, in swamps, and on unimproved muddy roads. Evacuation of casualties by litter is a slow and exhausting task and usually will require the use of many nonmedical personnel. Tracked vehicles, pack animals, rafts, boats, barges, litter bearers, or combination thereof, will be required in the evacuation of casualties to augment organic evacuation means. Natives properly supervised by trained medical personnel may be used as litter bearers.

b. *Aid Station and Aidman Stations.* Difficult terrain and wide dispersal of combat elements may dictate the need for further splitting of the aid stations and create a requirement for additional aid station personnel. Additional aidman support may be required by the front line combat units as in many instances two or more aidmen will be re-

quired to support each platoon in the rifle company. A minimum of one medical aidman is required to operate a company aid post.

140. Medical Platoon Headquarters

Perhaps the greatest problem of the medical platoon headquarters is that of resupply. The medical system of property exchange must be closely supervised to prevent the stock of medical items from falling to a dangerously low level.

141. Division Medical Battalion

The organization of the medical battalion is such that it will support the infantry battalion and other divisional elements on an area basis. The ambulances of the medical battalion may be replaced by other more maneuverable vehicles. Air evacuation from forward installations may be used to relieve surface transportation of part of its load and, at times, waterways afford a good route of evacuation. Evacuation by helicopter, if possible, is an excellent means of evacuation in the jungle. Mobile army surgical hospitals perform immediate surgery in the division area.

142. Personal Hygiene and Sanitation

a. The problem of personal hygiene is a serious and continuous one in the jungle. A determined and continuing effort by commanders at all levels must be made to provide sanitary facilities for their troops. The mere fact that troops are isolated in jungle areas for long periods of time does not justify letting the hair and beard grow, allowing clothing to become exceptionally dirty, and neglecting body cleanliness. Food handlers in particular must continue the high standards of hygiene which they normally maintain in garrison.

b. Careful and constant practice of military sanitation is imperative. Kitchen and human waste must be disposed of by acceptable methods, or diseases will quickly neutralize the fighting potential of an entire command (FM 21-10).

143. Insect- and Animal-Borne Diseases

Insect- and animal-borne diseases are those which are transmitted from man-to-man or from animal to man by a bloodsucking insect or animal. The germ may be introduced into the human bloodstream or tissues during the bite of the infected

insect or it may be deposited upon the skin by defecation or during the process of biting. In the latter two instances, scratching the insect bite infects the wound with the germs. The most common insect and animal disease carriers are listed below, together with suggestions for combating them. Troops must follow the precautionary and preventive measures described in order to avoid infection.

a. Diseases Transmitted by Mosquitoes.

- (1) Malaria, yellow fever, dengue (breakbone) fever, filariasis (elephantiasis), and some forms of encephalitis are mosquito-borne. Commanding officers are responsible for executing mosquito - control measures. Their decisions are based on the military situation and the recommendation of the medical service officers who make mosquito surveys. For a detailed discussion of mosquitoes and mosquito control, see FM 21-10 and AR 40-578.
- (2) For individual protective measures, use mosquito nets, protective clothing, insect repellent, and insecticide aerosols. At semipermanent camps large tents should be screened and sprayed with a residual insecticide. If malaria is present, use suppressive drugs as prescribed by the unit medical officer.

b. Diseases Transmitted by Ticks.

- (1) Hard ticks transmit Rocky Mountain spotted fever, other kinds of tickbite fevers (tick typhus), rabbit fever (Tularemia), and tick paralysis.
- (2) Soft ticks transmit famine fever (tick-borne relapsing fever).
- (3) For individual protection, wear clothing impregnated with repellent, and apply skin repellent to exposed areas. In a tick infested area, personnel should examine their bodies every 3 to 4 hours and remove any attached ticks. This can be facilitated by using the "buddy system". At semipermanent camps, brush and vegetation should be removed and appropriate insecticides should be applied as directed by medical service officers.

c. Diseases Transmitted by Sand Flies (Phlebotomus Flies).

- (1) Sand-fly fever, 3-day fever (pappataci fever), kalaazar (visceral leishmaniasis)

oriental sore, Delhi boil, and tropical sores are sand-fly borne.

- (2) For individual protection, use insect repellent, aerosols, protective clothing, and mosquito bar. In semipermanent camps, clear area of rubbish, debris, and ruins. Apply residual insecticide spray to inside of walls and around tent entrances.

d. Diseases Transmitted by Fleas.

- (1) The rat flea is a carrier of Black Death (bubonic plague) and murine typhus. The fleas of other rodents may also transmit these diseases.
- (2) For individual protection, apply skin repellent to exposed parts of body and impregnate clothing with clothing repellent. In semipermanent camps, apply residual insecticide spray or dust to floor and lower wall of tents, rodent burrows, and around rodent traps.

e. Diseases Transmitted by Body Lice.

- (1) The body louse and head louse may transmit jail fever (epidemic typhus fever), and famine fever (relapsing fever).
- (2) For individual protection against body lice, apply insecticide powder over inner surface of underclothing and to seams on inside of outer clothing. For head lice apply louse powder freely to the area of head covered by hair.

f. Disease Transmitted by Mites.

- (1) Mites are widely distributed throughout the world. The variety known as chiggers (red bugs) produce considerable skin irritation which may become secondarily infected from scratching. In the Far East, the six-legged larval stage of trombiculid mites transmit "scrub" typhus fever (Japanese river fever or tsutsugamushi fever).
- (2) For individual protection, apply skin repellent to exposed parts of the body and impregnate outer clothing and socks with clothing repellent.

g. Diseases Transmitted by Bloodsucking Flies.

- (1) Deer flies (chrysops) transmit rabbit fever (tularemia) and the filaria African eyeworm (loa-loa). In Central America

black flies and buffalo gnats transmit a filarial worm (*Onchocerca volvulus*) which causes a troublesome filarial disease. The tsetse fly of Central Africa transmits sleeping sickness (trypanosomiasis).

- (2) Mosquito nets, protective clothing, insect repellent, and insecticide aerosols should be used as preventive measures.

h. Diseases Transmitted by Triatomidae (Conenose Bugs, Assassin or Kissing Bugs). Conenose bugs may transmit American Trypanosomiasis (Chagas disease). To avoid these insects, do not sleep in native huts, native shops, stables, barns and chicken houses. For individual protection, use mosquito nets and protective clothing. At semipermanent camps or stations, buildings should be screened.

i. Diseases Transmitted by Vampire Bats. Vampire bats and occasionally other types of bats, transmit rabies (hydrophobia) to human beings and animals by their bite. The virus of rabies is carried in the saliva of the infected bat. Immediate first aid treatment consists of washing with soap and water, followed by an antiseptic and a sterile dressing. Antirabies treatment must be administered to persons bitten by any species of bat.

144. Waterborne Diseases (FM 21-10).

a. Disease. Typhoid fever, the paratyphoid fevers, bacillary dysentery, amebiasis, cholera, and other diseases may be transmitted by infected water which is used for drinking and cooking purposes. Schistosomiasis (blood fluke) may readily be encountered in surface water while bathing or swimming, and through drinking. When the fluke is known to be present, water must be avoided. It can enter the body system through any minute break in the skin. Standard methods of purifying water serve to destroy the larvae of the fluke, but it must be emphasized that at least two parts per million of chlorine must be present after a 30-minute contact period.

b. Preventive Measures.

- (1) *Sources.* Water selected for human consumption should be the cleanest available. Ground water from wells, springs, and infiltration galleries is usually less contaminated, clearer, cooler, and generally more palatable. However, since ground water is

limited in quantity, the most common source in the jungles will be surface supplies such as streams, ponds and lakes. Care must be exercised in selecting the water point to insure that bathing, laundering and vehicle or animal washing is done downstream.

- (2) *Engineer water points.* Whenever possible, all drinking water should be procured from engineer water points. Minimum treatment should consist of the following steps: Sedimentation, filtration, and chlorination to assure that the finished water contains not less than two parts per million chlorine residual.
- (3) *Emergency and individual water disinfection.*
 - (a) *Lyster bag disinfection.* Only the cleanest water available should be used. Suspended matter may be strained out through cloth or an improvised sand filter. Two ampules of calcium hypochlorite will be dissolved in the 36-gallon lyster bag to assure a minimum of two parts per million of chlorine residual as measured by the orthotoluidine kit after 30 minutes of contact.
 - (b) *Canteen disinfection.* Each man should be provided with an adequate supply of individual water purification tablets (FSN 6850-250-2620) for use on extended patrols or when otherwise isolated from his unit. Generally, adequate disinfection is obtained when one tablet is used for clear water and two tablets for cloudy or turbid water. Other methods, such as boiling and the squad method of chlorinating canteens, are discussed in detail in FM 21-10.
- (4) *Other water sources.* Water may be obtained during heavy rainfall by catchment from roofs of tents and buildings. This water must then be disinfected before consumption. Sea water can be distilled either in standard engineer equipment or in small quantities with an improvised distillation unit. Such facilities are bulky, extremely heavy, and require large amounts of fuel. Their use is justified only when fresh water is not available.

145. Intestinal Infections

a. Diseases. The principal diseases in this group which occur in the tropics are amoebic dysentery, bacillary (bacterial) dysentery, cholera, food infection, food contamination, worms (helminthic infections), paratyphoid fever, protozoal dysenteries, typhoid fever, and undulant fever (Malta fever). These diseases are usually transmitted by eating contaminated food or drinking untreated water. Contamination of food is common. The contamination may be caused in vegetable products by contact with infected material during growth, such as human excreta used as a fertilizer. Contamination of any food may be caused by dirty utensils or by food handlers who have, or are carriers of, intestinal diseases. Native fruits and vegetables which cannot be peeled or cooked should not be eaten.

b. Preventive Measures.

- (1) All perishables, both meats and vegetables, which cannot be stored in a refrigerator below 44° F., should be cooked immediately upon receipt except that frozen meats should be cooked immediately after thawing. All nonperishable food should be stored in verminfree boxes or chests. All food should be kept as free of dust as possible, and every effort must be made to prevent contamination during transit.
- (2) All foods should be served immediately after preparation. No leftovers should be served. Hard bread, canned meat, and other canned foods should be issued to troops in position unless hot food can be brought up in original containers. Sandwiches and other food for lunches should not be prepared and issued for later consumption.

146. Special Tropical Diseases

Tropical bubo (lymphogranuloma inguinale), and granuloma inguinale are diseases which may be transmitted through sexual intercourse. Tropical bubo is a virus disease. The initial lesion is so small that it usually passes unnoticed. Later the lymph glands in the groin become enlarged, break down, and ulcerate. Granuloma inguinale is usually limited to the genitalia and inguinal region, but may spread to other parts of the body. The lesions consist of large ulcerating areas which spread, gradually destroying the tissue as they advance.

147. Fungus Diseases of Skin and Hair

a. Diseases. Ringworm (tinea); athlete's foot (Epidermophytosis of the feet); and trichophytosis, a fungus disease of the hair, are the principal fungus diseases. The seriousness of these diseases, especially those of the ears and feet, is seldom realized except by men with long jungle experience. These diseases are especially serious in the jungle because—

- (1) The climate favors the growth of the microscopic plants called fungi which produce these diseases.
- (2) Sweat-soaked skin invites attack by fungus.
- (3) More individual effort is required to keep the body and clothes clean.
- (4) The extreme fatigue resulting from jungle marching is apt to cause soldiers to neglect to wash their clothes and bodies even though they have been told their health depends on cleanliness.
- (5) Some men lacking jungle experience falsely believe they are tough enough to stay healthy in the tropics and need not take the precautions prescribed.

b. Preventive Measures. It is much easier to prevent fungus diseases of the skin and hair than to cure them. The following preventive measures are important:

- (1) Keep as clean as possible and wash as often as is practicable. Use plenty of soap and water when available, both for bathing and washing clothes. Socks should be washed with soap at least once a day. If a stream cannot be reached after making camp, use a part of the water in the canteen and a little soap to wash at least the armpits, groin and feet.
- (2) Do not go barefooted in the jungle.
- (3) As far as possible, avoid soiling clothes. Avoid mud. Use the machete to provide a clean place to rest during halts. Unnecessary dirtiness is a sign of stupidity, not toughness.
- (4) Keep the skin dry, well ventilated, and free from tight clothing. Wear only enough clothing to afford protection from insects and thorns. Do not wear underclothes unless the other clothing chafes you. Wear

clothing and boots that will allow air to reach the skin.

- (5) Sleep with as little clothing as the temperature permits. Never sleep in wet, dirty clothing.
- (6) When the tactical situation permits, sleep off the ground, preferably in a hammock or on a platform.
- (7) Clean under and around the nails of the hands and feet.
- (8) Take sunbaths for short periods whenever practicable, but do not let the skin burn.
- (9) Stay away from native houses. Live and camp in clean, uninhabited jungle.
- (10) Dust socks and the inside of boots with foot powder.
- (11) Wash and sun articles, such as packboards, packs, harnesses and belts, especially those used by more than one man.
- (12) Officers and NCO's must hold frequent foot inspections.

c. Individual Jungle Treatment of Fungus Skin Infections.

- (1) During prolonged jungle operations, each soldier must take care of his skin and make every possible effort to keep infected skin areas clean, dry, well ventilated, and protected. As punctures of the skin can rapidly become infected, treat *all* wounds immediately with an antiseptic. Soap and

water help to cure, as well as prevent infections.

- (2) After washing, and just before retiring, treat infected skin areas with antifungus medicine. Do not scratch insect bites. Foot powder helps both foot and body rashes of the milder types.
- (3) In general, avoid bandages and greasy medicines. Dry up fungus infections with drying medicines in conjunction with air and sunlight.
- (4) Clean off dead, infected skin. Do not scratch.
- (5) Boil clothing, especially socks, when you have the opportunity. Do not wear one sock first on an infected foot and then on a healthy foot. Dry, stretch, and soften socks before replacing in field kit.
- (6) Avoid overtreating. Follow instructions. Do not use too much medicine or apply it too often.
- (7) Consider all skin diseases as serious. Treat them regularly, intelligently, and patiently.

d. Remedial Action. Fungus diseases, if neglected, will incapacitate many men, regardless of personal cleanliness and the use of foot powder. At the first symptoms of a fungus infection, use the prescribed medicine carried in the individual or group first aid kits. When inflammation or itching is excessive, consult a medical officer as soon as possible.

Section III. EVACUATION

148. General

The evacuation of wounded in jungle warfare presents a difficult problem. The task of carrying a casualty to the medical installation may require the traversing of rough terrain. There is a higher proportion of litter wounded cases than ordinarily encountered since even a slightly wounded individual may find it impossible to struggle over rough terrain. As a result, the casualty ordinarily classified as "walking wounded" may become a litter case.

149. Equipment

The usual equipment and property prescribed by the table of organization and equipment for units concerned with evacuation are not always suitable

for operation under jungle conditions. For this reason all types of transportation, whether by water, land, or air may be used to transport casualties to the rear. This principle applies not only to vehicles assigned primarily for this purpose, but also to empty supply vehicles returning from forward positions. Evacuation in the jungle would normally be along supply routes which are adequately protected against enemy action.

a. Litters. The standard folding litter has some disadvantages when evacuation involves the crossing of streams, gullies, and steep slopes. Metal basket litters (mountain type) are more practicable under these conditions and can also be used to advantage when casualties are being moved from jungle areas

to ships for evacuation by water. The metal basket litter can be rigged to evacuate casualties by pack animal. Native litter bearers may prefer to use ordinary canvas sheets with loops for poles. The canvas sheeting is light, and poles may be cut when needed. All available means for collecting and transporting the sick and wounded must be used to do the job satisfactorily. Improvised litters can also be made from ponchos, shelter halves, fatigue jackets, parachutes, woven vines on poles, etc. For general methods of transporting the sick and wounded, see FM 8-35.

b. Human Factors.

- (1) It is easy to overestimate the strength and

endurance of litter squads. Well conditioned men, carrying a patient on a litter for 400 to 600 yards over jungle terrain, are unable to repeat the performance without an appreciable amount of rest. Surgeons must keep their commanders informed of the adequacy and efficiency of the evacuation system, and commanders must provide additional natives when practicable and, at times, rotate men from other units of the command.

- (2) No man should be evacuated who may be treated locally and returned to duty.

Section IV. MAINTENANCE

150. Equipment and Supplies

Although specific instructions on care and maintenance of clothing, equipment and supplies can be found in pertinent field and technical manuals, the following items are singled out for specific comment:

a. Clothes. Keep all clothing or cloth materials clean and dry. If dirty, wash in water and allow to air dry. Dirt tends to deteriorate fabric. Repair small tears or holes as soon as possible.

b. Compass. The compass should be kept clean and dry at all times. Daily inspections should be made to prevent corrosive formations, especially on the bezel ring and other metal parts. Moving parts should not be forced or bent. Prevent loss when in use by means of a strong cord attached to the thumb loop and tied to the pistol or cartridge belt.

c. Machete. Use heavy oil or grease to prevent rust. Use a grindstone, whetstone or smooth field stone (preferably sandstone) to sharpen. Do not sharpen the blade overly thin; sharpen it to a medium angle. Avoid overheating of blade to protect temper. Avoid notching or wrapping of the handle as the roughness will cause blisters. Repair or replace all broken or cracked handles.

d. Weapons. Keep all weapons well oiled. Check continuously for extraneous matter, such as mud and vegetation, inside the barrels or working parts. Always apply raw linseed oil or other suitable stock preparations on wooden parts to protect them from warping.

e. Ammunition. Waterproof ammunition packaging should be opened only when absolutely necessary. Loose rounds of ammunition and magazines should be inspected daily. Wipe off rounds if wet; check magazines for dirt, mud, bent lips, dents or other defects that may cause malfunctions. Ammunition should be stored in dry places and on dunnage if possible. Do not leave ammunition to dry in the sun. Do not store it under the direct rays of the sun for extended periods of time. Ammunition exposed to abnormal heat for extended periods of time could perform erratically.

f. Communications Equipment. Normal weekly maintenance as performed in temperate zones will not suffice in tropical areas. Daily maintenance is required to maintain systems operational. Keep communications equipment dry. Check for dampness that affects performance and creates corrosion. Check daily for fungus on edges of insulators, keys and jacks. Fungus can cause short circuits and will lower performance. Check equipment for insects and for small animals such as lizards and rodents. Give *special care and attention* to batteries as communication equipment will be only as good as its power source. (For detailed information on battery care, see TM 11-415 and SB 11-6.) When proper storage facilities for electrical and electronic equipment do not exist, *improvise*. Drying chambers can be improvised using packing crates with light bulbs as heating elements. (Do not create fire hazards.)

g. Tentage. Clean and wash all tents and tarpaulins if dirty or muddy. Allow air drying before

storage. Inspect carefully and repair all hole and seam damage immediately.

h. Rope. Clean muddy ropes by washing in water. Do not allow ropes to dry dirty. Dry them before storage. Do not store in damp places. Avoid pulling ropes over sharp edges as this will reduce the working strength of strands. Repair all broken strands

immediately. Use only correct whipping to secure unravelled rope ends. When stored, rope should be placed on grating or dunnage that will permit air circulation. Wet rope contracts; on wet fixed installations allow for contraction with slack. Failure to provide for contraction will result in broken strands which will render the rope unsafe.

APPENDIX I

REFERENCES

AR 320-5	Dictionary of United States Army Terms
AR 320-50	Authorized Abbreviations and Brevity Codes
AR 350-30	Code of Conduct
FM 1-5	Army Aviation; Organization and Employment
FM 1-100	Army Aviation
FM 3-5	Chemical, Biological and Radiological (CBR) Operations
FM 3-10	Chemical and Biological Weapons Employment
FM 5-1	Engineer Troop Organizations and Operations
FM 5-20	Camouflage, Basic Principles and Field Camouflage
FM 5-31	Use and Installation of Booby Traps
FM 5-34	Engineer Field Data
FM 5-35	Engineers' Reference and Logistical Data
FM 6-20-1	Field Artillery Tactics
FM 6-20-2	Field Artillery Techniques
FM 7-11	Rifle Company, Infantry, Airborne Infantry and Mechanized Infantry
FM 7-15	Infantry, Airborne Infantry, and Mechanized Infantry, Rifle Platoons and Squads
FM 7-20	Infantry, Airborne Infantry, and Mechanized Infantry Battalions
FM 7-24	Communications in Infantry and Airborne Divisions
FM 8-35	Transportation of the Sick and Wounded
FM 17-33	Tank Units, Platoon, Company and Battalion
FM 20-20	Military Dog Training and Employment
FM 20-32	Land Mine Warfare
FM 20-33	Combat Flame Operations
FM 20-150	National Search and Rescue Manual
FM 21-10	Military Sanitation
FM 21-11	First Aid for Soldiers
FM 21-18	Foot Marches
FM 21-26	Map Reading
FM 21-30	Military Symbols
FM 21-31	Topographic Symbols
FM 21-40	Small Unit Procedures in Chemical, Biological and Radiological (CBR) Operations
FM 21-41	Soldier's Handbook for Chemical and Biological Operations and Nuclear Warfare
FM 21-50	Ranger Training and Ranger Operations
FM 21-60	Visual Signals
FM 21-75	Combat Training of the Individual Soldier and Patrolling

FM 21-76	Survival
FM 21-77	Evasion and Escape
FM 23-30	Grenades and Pyrotechnics
FM 23-71	Rifle Marksmanship
FM 23-92	4.2 Inch Mortar, M30
FM 24-18	Field Radio Techniques
FM 24-20	Field Wire and Field Cable Techniques
FM 30-5	Combat Intelligence
FM 30-30	Aircraft Recognition Manual
FM 31-15	Operations Against Irregular Forces
FM 31-16	Counter guerrilla Operations
FM 31-21	Special Forces Operations
FM 31-22	U. S. Army Counterinsurgency Forces
FM 31-50	Combat in Fortified Areas and Towns
FM 31-60	River Crossing Operations
FM 31-72	Mountain Operations
FM 44-1	U. S. Army Air Defense Employment
FM 57-35	Airmobile Operations
FM 100-5	Field Service Regulations—Operations
FM 110-115	Amphibious Reconnaissance; Joint Landing Force Manual
TM 1-300	Meteorology for Army Aviation
TM 3-200	Capabilities and Employment of Toxic Chemicals
TM 3-220	Chemical, Biological and Radiological (CBR) Decontamination
TM 5-270	Cableways, Tramways, and Suspension Bridges
TM 5-330	Planning Site Selection, and Design of Roads, Airfields and Heliports in the Theater of Operations
TM 5-725	Rigging
TM 9-1900	Ammunition, General
TM 9-2117	Winchester Riot Type Shotgun M12 and Stevens Riot Type Shotguns M520-30 and M620A.
TM 9-2205	Fundamentals of Small Arms
TM 9-6920-210-14	Operator, Organizational and Field Maintenance Manual: Targets, Target Material and Training Course Layouts
TM 11-666	Antennas and Radio Propagation
DA Pam 20-151	Lectures on the Geneva Conventions of 1949
DA Pam 21-71	The U. S. Fighting Man's Code
DA Pam 30-101	Communist Interrogation, Indoctrination and Exploitation of Prisoners of War
DA Pam 310-3	Military Publications: Index of Doctrinal, Training and Organizational Publications
ASubjSed 44-2	Visual Aircraft Recognition

APPENDIX II

RECOMMENDED TRAINING PROGRAM

1. Purpose and Scope

a. This program of instruction is designed to assist commanders in preparing their units for combat in jungle areas. The training is specialized, specific in scope and progresses from individual to company level.

b. To receive maximum benefit, all units and individuals must have completed combat training as prescribed by appropriate Army Training Programs prior to initiation of the jungle training program.

c. The principles and tactical doctrines outlined in Department of the Army publications are applicable to jungle operations. However, the difficulties caused by the rugged and complex terrain, dense vegetation, water barriers and oppressive climatic conditions of jungle areas necessitate special training. Training must be designed to illustrate to individuals and unit leaders the effect that jungle terrain has on application of accepted combat techniques, the adjustments that are necessary and the fact that all individuals require acclimation to the peculiar environment of the wet tropics before maximum efficiency can be attained.

d. Application of this training program under actual tropical conditions or over actual jungle terrain is, of course, the optimum training situation. However, it is mandatory for all commanders to realize that training for jungle combat can be conducted in other types of terrain. Dense woods, marshes, swamps and other types of terrain can be utilized. The important thing to keep in mind is the quality of training that is offered to troops; they must be properly motivated and all instruction must be pertinent to and correlated with aspects of the jungle.

2. Concurrent Training

The suggested method of implementing simultaneous training activities is by the division of students into groups. By rotation of groups between

exercises that are being conducted concurrently in the same general area, a maximum amount of training can be presented in the minimum amount of time.

3. Emphasis

a. During all training, special emphasis must be placed on the following factors of training and operations:

- Detailed planning for all actions
- Efficiency of junior leaders
- Physical fitness
- Personal hygiene and sanitation
- Ambush and counterambush
- Navigation
- March security
- Fire discipline and control
- Reconnaissance
- Silent movement
- Communications
- Supply and evacuation
- Patrolling

b. An appreciation and working knowledge of the above training factors and their application in jungle terrain are necessary before individuals and units can be considered ready for jungle operations. Therefore, it is suggested that these factors be indicated as points of emphasis and/or as training objectives in the appropriate training memoranda published by units concerned.

4. Subjects To Be Presented

The following subjects should be included in a jungle training program. Training must be rugged and realistic. The training is predicated on the premise that all individuals are trained for normal operations but have no particular experience in jungle operations. Subject designations are:

<i>Subject title</i>	<i>Recommended hours and type of instruction</i>	<i>Scope</i>
Ambush and Counterambush Tactics	7—Conference (C), Practical Exercise (PE)	Conference on purpose, characteristics and application of ambush and counterambush techniques. Emphasis on suitability of jungle terrain for ambush. Practical exercise requiring students in squad-size units to apply ambush and counterambush techniques. Observers with each squad conduct critiques.
Boat Drill	4—C, Demonstration (D), PE	Integrated conference, demonstration and practical exercise in the use of military and native small boats in jungle operations. Includes basic commands, loading and unloading procedures, handling techniques and water safety.
Communications	1—C, D	An integrated conference and demonstration covering the employment of various communications systems in jungle terrain. The limitations imposed by the weather, vegetation and terrain of jungle areas on all means of communications are discussed. Use of expedients to overcome reduced efficiency is stressed.
IMMEDIATE ACTION Drills	4—C, PE	Instruction on principles and techniques of three basic contact drills: ambush, immediate action (counterambush) and meeting engagement. Practical exercise requiring conduct of squad size combat patrols and application of basic techniques of reaction to contact. Detailed critique is given to each squad by officer lane observer.
Physiological Effects of Heat	1—C	Description of effects of heat on human body; symptoms, cure, and prevention of heat exhaustion, heat cramps, and heat stroke; explanation of the acclimatization process, to include method of aiding the process; general rules to prevent heat disorders.
Escape and Evasion	37—C, PE	One hour conference reviews Code of Conduct and escape and evasion techniques. Emphasis is placed on the advantage provided the escapee or the evader by the jungle. Thirty-six hour practical exercise requiring infiltration through 8,000 meters of "enemy-dominated" area to friendly territory.
Reaction Test Phase III, Fire Destruction and Effects	4—C, PE	Emphasis is on need for well directed, concentrated fire in actions conducted during close combat; explanation that fire, properly planned and employed, will inflict maximum casualties and damage on targets which cannot be seen; review of basic visual (silent) signals; practical exercise requiring rifle squad to engage covered and concealed targets with live ammunition; targets are scored to show effectiveness of fire by squads.
Guerrilla Operations and Suppression of Guerrilla Forces	3—C	Introduction to the nature, characteristics, requirements and techniques of guerrilla warfare; capabilities and limitations of guerrilla forces; organization of a typical irregular force; operations against guerrilla elements; effects of jungle terrain on guerrilla and antiguerrilla operations.
Jungle Living	30—C, D, PE	Description and demonstration of issue clothing and equipment best suited for jungle operations; demonstration on proper employment of the machete; tropical diseases, their causes and methods of prevention; procurement, sources, and purification of drinking water; care of the body; field sanitation procedures; survival in jungle to include description of jungle shelters, techniques of construction and use of jungle materials; traps and snares; demonstrations and tour of exhibit areas to illustrate types of jungle shelters. Demonstration of snares and traps. Thirty hour practical exercise requiring students to construct semi-permanent shelters using only jungle materials; preparation and consumption of special rations. Students should live in shelters for at least one week.

<i>Subject title</i>	<i>Recommended hours and type of instruction</i>	<i>Scope</i>
Jungle Navigation (Day).....	11—C, PE	A brief review of the use of the compass and basic map reading techniques; methods and techniques of navigation in jungle. Conference followed by a practical exercise requiring students to complete compass and navigation course, about 5,000 meters in length.

APPENDIX III

A RECOMMENDED STANDING OPERATING PROCEDURE

MANLOADS AND EQUIPMENT

LISTS FOR OFFENSIVE COMBAT IN JUNGLE

I. GENERAL

A. PURPOSE.

This SOP is intended to serve as a guide to commanders and staff officers when planning manloads and equipment lists for use by rifle companies during training for jungle combat or during actual operations in jungle environment.

B. SCOPE.

The clothing, equipment, weapons and ammunition to be carried by the individual soldier and platoon loads are described by this SOP. The contents of this SOP are predicated upon the premise that a dismounted rifle company can operate independently and unsupported with resupply for three days.

C. APPLICATION.

The contents of this SOP apply to the dismounted rifle company when conducting, preparing for, or training to conduct independent offensive operations against lightly armed guerrillas in jungle terrain. It should be modified as required for other organizations and equipment.

II. ORGANIZATION, MANLOADS AND PLATOON LOADS.

A. ORGANIZATION OF COMPANY PERSONNEL.

1. Company headquarters—no change.
2. Rifle platoons—no change.
3. Weapons platoons—no change.
4. Rear echelon—Supply Sergeant, Company Clerk, and Supply Truck Driver.

B. INDIVIDUAL MANLOAD.

<u>Item No.</u>	<u>Unit</u>	<u>Description</u>	<u>Weight</u>
1	1	Bar, Insect, Field	1 lb 15 oz
2	1	Poncho	2 lbs
3	SET	Trousers and Jacket, Utility	2 lbs 5 oz
4	1	Cap, Utility	3 oz
5	1	Field Pack, Combat	12 oz
6	2	Canteen, w/Caps and Carriers (FULL) at 3 lbs 8 oz	7 lbs
7	SET	Underwear and socks	9 oz
8	1	Pair Extra Socks	2 oz
9 & 10	1	Belt, w/First Aid Packet	1 lb
11	2	Magazines	1 lb
12	2	Ammunition Pouches (Attached to Pack)	1 lb 8 oz
13	1	Suspenders, Field Pack, Combat	12 oz
14	Pr.	Boots, Jungle	4 lbs
15	SET	Toilet Articles	16 oz
16	SET	Insect Repellent, Foot Powder, Fuel, Ration, Heating, Purification Tablets	8 oz
17	6	Meals, Combat	10 lbs 2 oz
18	1	Machete w/Scabbard	1 lb 14 oz
TOTAL WEIGHT			35 lb 10 oz

C. UNIT EQUIPMENT, DISTRIBUTION, AND WEIGHTS.

1. Company Headquarters Load.

Item No.	Unit	Description	Weight
1	1	Metascope, Transistorized w/o batteries	2 lbs 8 oz
2	2	Bottles, Salt, Tab 5 oz	10 oz
3	1	Pre-cut antenna	13 oz
4	1	150 feet nylon rope	1 lb 8 oz
5	2	Compass w/case—6 oz	12 oz
6	2	Files (for machete)	1 lb 8 oz
7	1	Switchboard 993/GT	2 lbs 4 oz
8	5	Flashlights w/battery—12 oz	3 lbs 12 oz
9	1	Set Panel Marker	1 lb 13 oz
10	1	TA-1	3 lbs
11	4	Toolkit TE 33-1 1 lb	4 lbs
12	1	PRC-10, less battery and battery case	9 lbs 9 oz
13	1	Intrenching tool w/cover	3 lbs
14	1	Adhesive tape, 2 inches	2 lbs
15	1	DR-8 w/¼ mile wire & RL 39	14 lbs 6 oz
16	2	Rifle Cleaning Kits	1 lb 8 oz
17	1	Oil, lubricating (1 qt)	2 lbs 2 oz
18	1	Grenade Launcher	7 oz
19	1	Binoculars w/case	2 lbs 12 oz
20	1	Set Climbers LC-5	4 lbs 8 oz
21	4	Grenades, Rifle, Smoke, Streamer	1 lb 8 oz
22	4	Signal, Ground, Star Cluster	1 lb 5 oz
23	2	PRC-10 w/battery—21 lbs 8 oz	43 lbs
24	1	Packboard	5 lbs
25	4	PRC-10 batteries	16 lbs 2 oz
TOTAL WEIGHT			138 lbs 11 oz

2. Rifle Platoon Load.

Item No.	Unit	Description	Weight
1	1	Packboard	5 lbs
2	1	Metascope, Transistorized w/o batteries	2 lbs 8 oz
3	4	Bottles Salt Tab—5 oz	1 lb 4 oz
4	1	Pre-cut antenna	13 oz
5	1	150 feet nylon rope	1 lb 8 oz
6	4	Compass, Mag, Lensatic w/Case—6 oz	1 lb 8 oz
7	4	Files (for machete) 12 oz	3 lbs
8	1	Oil, Lubricating, 1 qt	2 lbs 2 oz
9	10	Flashlights—12 oz	7 lbs 8 oz
10	1	TA-1	3 lbs
11	1	PRC-10 w/battery	21 lbs 8 oz
12	1	Tool Kit TE-33	1 lb
13	2	PRC-10 battery	13 lbs
14	1	DR-8 w/¼ mile wire & RL 39	14 lbs 6 oz
15	8	Rifle Cleaning Kits	6 lbs
16	5	Grenade Launcher—7 oz	2 lbs 3 oz
17	1	Binoculars 6x30 w/case	2 lbs 12 oz
18	4	Intrenching tool w/cover—3 lbs	12 lbs
19	4	Grenades, Rifle, Smoke, Streamer	1 lb 8 oz
20	4	Signal, Ground, Star Cluster	1 lb 5 oz
21	1600	Rounds, 7.62mm, MLB, w/ammo cans	104 lbs
22	7	Rounds, 3.5 inch r/1, Heat—9 lbs	63 lbs
TOTAL WEIGHT			273 lbs 6 oz

3. Weapons Platoon Load.

Item No.	Unit	Description	Weight
1	1	Metascope, Transistorized w/o batteries	2 lbs 8 oz
2	4	Bottles, Salt Tabs—5 oz	1 lb 4 oz
3	1	Pre-cut antenna	13 oz
4	1	150 feet Nylon Rope	1 lb 8 oz

Item No.	Unit	Description	Weight
5	4	Compass, Magnetic, Lensatic w/case	1 lb 8 oz
6	4	Files (for machete)—12 oz	3 lbs
7	1	Oil, lubricating, 1 qt	2 lbs 2 oz
8	10	Flashlights w/batteries—12 oz	7 lbs 8 oz
9	1	TA-1	3 lbs
10	1	PRC-10 w/battery	21 lbs 8 oz
11	1	Tool Kit, TE 33	1 lb
12	2	PRC-10 Battery	13 lbs 1 oz
13	1	DR-8 w/¼ mile wire & RL 39	14 lbs 6 oz
14	8	Rifle, Cleaning Kits	6 lbs
15	4	Grenade Launcher—7 oz	1 lb 12 oz
16	1	Binoculars 6x30 w/case	2 lbs 12 oz
17	4	Intrenching Tool w/cover—3 lbs	12 oz
18	4	Grenades, Rifle, Smoke, Streamer	1 lb 8 oz
19	4	Signal, Ground, Star Cluster	1 lb 5 oz
TOTAL WEIGHT			86 lb 6 oz

4. Medical Section Load.

Item No.	Unit	Description	Weight
1	1	Oral Thermometer w/case	
2	18	Band Aids (1 box)	
3	1	Antropine (5 syrettes)	
4	1	Aspirin Tablets (1 bottle)	
5	1	Tablet, EMT	
6	1	Medical Bag	
7	12	Safety Pins (2 cards)	
8	1	Snake Bite Kit	
9	1	Hemo Set (Tourniquet, scissors & forceps)	
10	1	Anti-venom kit	
11	2	Bandage Muslin	
12	1	Morphine (5 syrettes)	
13	16	First Aid Dressings, Field	
14	1	Minor Surgery Kit w/suture	
15	1	Scissors, Bandage	
16	3	Benzalkonium Chloride Tincture (10 cc)	
17	1	Adhesive Tape (3" x 2 yards)	
18	1	Guedel Airway	
19	1	Wire Fabric (5¼ x 36 inches)	
20	6	Tetracaine Ophthalmic Ointment (1 box)	
TOTAL WEIGHT			7 lb 13 oz

III. WEAPONS AND AMMUNITION.

A. WEAPONS AND AMMUNITION FOR RIFLEMEN.

1 rifle, M-14	9 lb 2 oz
1 Bayonet, w/Scabbard	1 lb 12 oz
120 Ctg, 7.62mm	7 lb 4 oz
2 Grenades, Hand, Fragmentation—1 lb 8 oz	3 lbs
TOTAL WEIGHT	21 lbs 2 oz

B. WEAPON AND AMMUNITION FOR SHOTGUN CARRIERS.

1 shotgun, 12 Gauge	10 lbs 8 oz
50 Rds, 00 buck, metallic case	12 lbs
2 Grenades, Hand, Fragmentation—1 lb 8 oz	3 lbs
1 Bayonet, w/Scabbard	1 lb 12 oz
TOTAL WEIGHT	27 lbs 4 oz

C. WEAPON AND AMMUNITION FOR PISTOLEERS.

1 Pistol, Cal .45 w/Holster	2 lbs 15 oz
35 Ctg, Cal .45	1 lb 11 oz
1 Magazine	2 oz
2 Grenade, Hand, Fragmentation—1 lb 8 oz	3 lbs
1 Bayonet, w/Scabbard	1 lb 12 oz
TOTAL WEIGHT	9 lbs 8 oz

D. WEAPON FOR 3.5 ROCKET LAUNCHER GUNNER.

1 3.5 Inch Rocket Launcher	15 lbs
Equipment for Pistoleers	
See "C" above	9 lbs 8 oz

E. WEAPON AND AMMUNITION FOR MACHINE GUN (M-60) GUNNER.

1 Machine gun, M-60 w/bipods	23 lbs 2 oz
100 Ctg, Cal 7.62mm	6 lbs 3 oz
TOTAL WEIGHT	29 lbs 5 oz

Equipment for Pistoleers

See "C" above	9 lbs 8 oz
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F. WEAPONS AND EQUIPMENT FOR GRENADIER.

1 Grenade launcher, M79	6 lbs
18 Rds Ammunition 40m/m fixed—8 oz ea	9 lbs
TOTAL WEIGHT	15 lbs

IV. SPECIAL CONSIDERATIONS.

A. ADDITIONAL OR MODIFIED EQUIPMENT.

1. One set, pole climbers, LC-5 will prove useful for rigging expedient antennas. This equipment is not organic to the rifle company, but is available within the parent battalion.
2. Shotguns are available through the appropriate Tables of Allowances. Recommended issue is two per rifle squad, two per Company Headquarters, and four per weapons platoon (in lieu of the M-14 rifle where appropriate).
3. The 3.5 inch rocket launcher should be used by each rifle platoon in lieu of the 90mm recoilless rifle, M67. The rocket launcher is more portable and furnishes sufficient high explosive capability for the type of mission assigned.

B. PERSONNEL AND EQUIPMENT NOT NORMALLY NEEDED.

1. The Company Supply Sergeant, Company Clerk and Supply Driver, will normally be more useful in performing administrative duties and preparations for resupply of the company at the trains area.
2. Tripods for the M60 machine gun are not often needed during offensive combat in jungle. The use of the tripod is not practical due to the limited observation, short fields of fire and the tendency to hang up on vegetation even when folded.
3. 81mm mortars, 106mm and 90mm recoilless rifles are impractical because of their weight, the weight of the ammunition and the limitations imposed on their use by the terrain and foliage.

C. COMMUNICATIONS EQUIPMENT.

1. Pre-fabricated half-rhombic antennas are often more effective in jungle than the standard equipment.
2. AN/PRC-6 radios should not be carried if distances between stations are expected to exceed 50 meters.
3. The telephone TA-1 will normally suffice in offensive actions and are much lighter than the telephone TA-312.

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By Order of the Secretary of the Army:

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For explanation of abbreviations used, see AR 320-50.